Railway noineering amtenance

On curves, tangents and grades, track is subjected to terrific stresses and shocks. The tremendous reserve power of Improved Hipower Spring Washers cushions and absorbs these shocks, equalizing bolt tension, assuring resilient joints, protecting rail ends and joint bars.

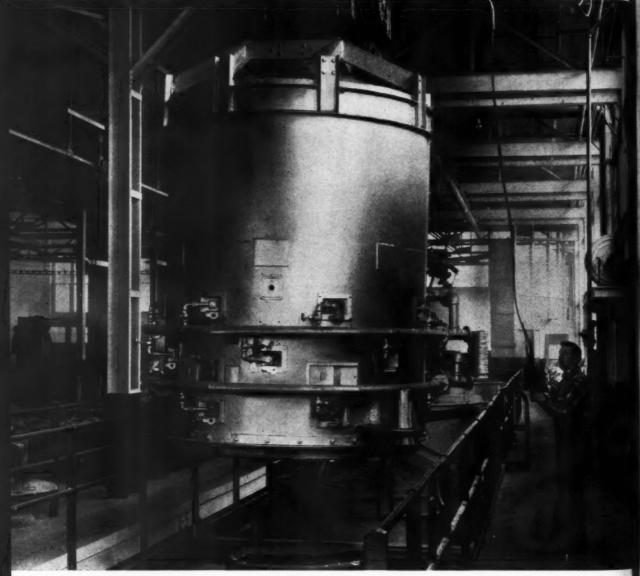
IMPROVED HIPOWERS

IMPROVE TRACK



Reliance HY-CROME Spring Washers

"Under Cover" at RELIANCE



"Edgemark of Quality"



"UNDER COVER" at Reliance has a definite significance • Steel high decarburized of non-uniform structure will fail to measure up to full a pectancy when fabricated into Spring washers; this condition reflects of physical properties and non-uniform performance • But "UNDER COVED of these atmospherically controlled furnaces at Reliance special alloy steel thy-Crome Spring Washers starts its first step towards the high quality finish product which will successfully meet all requirements in keeping bolted a semblies tight and under constant tension with automatic compensation inevitable wear. Hy-Crome Steel "UNDER COVER" like this means in Crome Spring Washers of exceptional quality and uniformity.

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hook

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A guard rail you can install and forget

If your guard rails are frequently requiring attention, here's one you can put on the job and forget about. Maintenance engineers say it is the safest guard rail, requiring the least maintenance, of any they know.

There are several reasons for this. The Bethlehem Hook Flange Guard Rail is all in one piece. It consists of a tough, hard, rolled-steel rail, bolted to special tie plates with heat-treated high-tensile steel bolts, fitted with lock-nuts. One flange is lowered to form a hook that fits under the running rail. Thus, the weight of the train prevents it from overturning, regard-

less of side thrust. Also, spreading is impossible.

Another advantage of the Hook Flange Guard Rail is its cushioning action, since the design permits dissipation of impacts. The guard rail eases fast-moving wheels into line with minimum shock and jolt, keeping maintenance costs down.

No wonder so many maintenance engineers have adopted the Bethlehem Hook Flange Guard Rail for use in turnouts and crossovers on high-speed main lines and in classification yards and terminals.





Above: Flame cleaning section of a railroad bridge.

Right: The same panel after flame cleaning and wire brushing.

Note absence of loose rust, scale or old paint.



A simple, inexpensive way to make paint last longer on exposed steelwork

Flame cleaning, perfected by Airco, goes all the way in preparing exposed steel surfaces such as bridges, signal towers, tanks and steel cars for maintenance painting. Quickly and easily applied, the oxyacetylene flame process often burns off most of the old paint as well as loosening all scale and rust which hold entrapped moisture, the frequent cause of premature failure of the paint coat. The surface, after wire brushing, is left free of all loose material.

In addition, the heat of the flame warms the steel and drives off all moisture, affording ideal conditions for repainting promptly after wire brushing.

For complete information with suggested specifications covering work of all types, obtain your copy of our folder ADG-1066A. Use the coupon — no obligation.

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60 East 42nd Street
New York 17, N. Y.
Gentlemen: REM
Please furnish me with a copy
of Form ADG-1066A by early
return mail.

ARCO WILSON

* BUY UNITED STATES WAR BONDS *

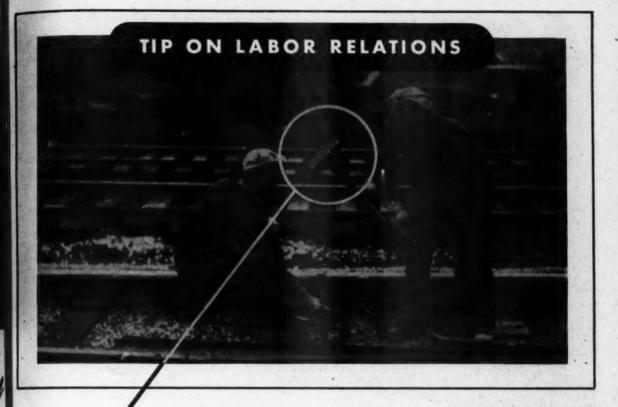
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General Offices: 60 East 42nd Street, New York 17, N. Y. In Texas: Magnotia Airco Gas Products Co. General Offices: Houston 1, Tex. Offices in all Principal Cities

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Your crews will work faster with Quality Tools

Any man who works with his hands appreciates high quality tools as exemplified by the Devil Line.

You know all of that...from your own experience on the job...or from tinkering around at home in your own hobby workshop. You also know there's something about a quality tool that stimulates the workman...he not only does a better job, but he gets more done.

The quality of Devil Line is strictly prewar. All are made from electric furnace alloy tool steels, hand forged and heat treated. All striking faces and cutting edges are ground and heat treated.

Deliveries still plague us but 'round-the-clock production has enabled Warren Tool Corporation to ship more tools to the railroads than any time in our history.

WARREN TOOL CORP. . WARREN, OHIO



CLAW AND TAPPING BARS,

CLAY AND TAPPING PICKS,

TRACK AND OX-DEVIL CHISELS,

SPIKE MAULS, SLEDGES, ADZES



FROM a mechanical standpoint the decision in World War Number One hinged on the famous French "75".

The secret of this miracle gun was a hydraulic device which absorbed recoil shock and did away with re-rangefinding—thus making possible a new degree of rapid fire.

This device, invented by Maurice Houdaille, a French Engineer, is the *basis* of Houdaille Shock Absorbers.

HOUDAILLE* hydraulic devices, controlling shocks, rebounds and off-balance forces, have many peacetime and wartime applications: On modern streamline trains, to prevent side-sway and bounce—on all types of automotive equipment—on United Nations' "tank-killers"—as shimmy dampers on nose and tail wheels of our

big bombers, combat and cargo planes—on maching guns to dampen recoil—on the jaws of steam-shovels-on railway switch-points—on heavy drop-hammers—or oil pipe-lines to prevent pressure vibration—just to mention some of Houdaille Shock Absorber adaptations.

Born on the battlefield, Houdaille hydraulic deviet have contributed substantially to industrial, transport tion, and military progress.

HOUDE ENGINEERING DIVISION
HOUDAILLE-HERSHEY CORPORATION

BUFFALO 11, NEW YORK Makers of Hydraulic Controls



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*Pronounced "HOO-DYE"



Oh How They HAVE To Get Up In The Morning

Bombers never sleep late. No sir! It's up at the crack of dawn . . . up for a crack at the enemy. And during the warming up period, when bombers get their "shave and shower," you hear the steady hum of the good old "putt-putts" . . . the Homelite Portable Generators that pour out juice for charging batteries and testing electrical equipment on those giant fighting birds.

And don't forget this . . . ground crews, the men who groom the planes, demand top-notch performance and reliability. Failures drive them nuts. And the specifications handed down for the equipment they use are a challenge to manufacturers.

Yet, here at Homelite, we're making gasoline-engine-driven generators that meet these needs . . . so light-weight, they can be carried in the plane . . . so compact, they can be moved anywhere at the base. Strong, durable generators that stand up under hard usage. Powerful ones, that generate plenty of current. Dependable Homelites, that operate in any climate.

Oh how they'll HAVE to

Oh how they'll HAVE to get out at night

After the war, Homelites will be back on the old stand . . . making many new friends . . . by furnishing power for brilliant floodlights and electric tools, so necessary to speed work and increase safety on night construction and emergency repairs.

HOMELITE CORPORATION

Railway Engineering at Maintenance

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"COME ONE-COME BOTH!"

Tough and ready "110" can handle these birds. He's got just what it takes to lick both abrasion and shock at once. When he puts on a hard-surface, it's there to stay — and parts stay on the job longer.

This special P&H Alloy Electrode is used for general repair and maintenance when abrasion and shock resistant welds are needed. "110" has a hardness range of from 20 to 40 Rockwell "C" without heat treatment. With flame hardening, its values run as high as 62 Rockwell "C".

Whatever your wartime problems demand, there is a P&H Alloy Electrode ready to serve. The complete line includes all types for hard-surfacing, resistance to wear, impact and abrasion, for welding stainless steels, 4-6% chrome steels, air hardening steels, etc.

See your P&H representative for information and procedures, or write us.

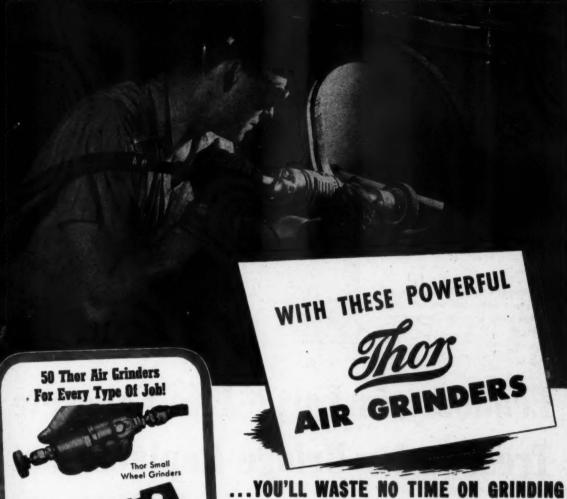


Get the story on P&H A.C. and D.C. are welders. Learn how their simplicity of operation can give you greater welding production and faster operator-training. All P&H welders are rated on WSR which gives exact welding current from minimum to maximum capacity. Send for literature today. Early deliveries possible.

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HARNISCHFEGER

Canadian Distribution: The Canadian Fairbanks-Morse Co., Ltd.



To give you top speed for peak production grinding . . . to give you precisely the type of power, light weight, and extreme stamina that make it possible, THOR Air Grinders have these advanced construction features:

- THOR "Air Behind the Blades" principle keeps the rotor blades out against the cylinder bushing wall, preventing dead center position and assuring instant starting under all operating conditions.
- The solid one piece construction of the THOR rotor permits the use of deeper blade slots and wider blades. This greatly boosts the power and the rate of material removal.
- 3. The ThOR Double-Acting Safety Governor acts to save time in two ways: It regulates spindle speed to the level of highest grinding efficiency for the size and type of wheel used. It prevents racing of wheels at dangerously high speeds even in event of mechanical failure of governor parts.

You will find these top speed construction features, plus others like THOR End Exhaust, Automatic Lubrication, and Labyrinth Seal on Spindle, in a complete line of THOR Air Grinders for every industrial application. For details, write for THOR Pneumatic Catalog No. 52B.



Portable Pneumatic and Electric Tools

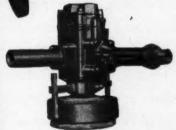
INDEPENDENT PNEUMATIC TOOL COMPANY



600 W. JACKSON BOULEVARD, CHICAGO, ILL. Branches in Principal Cities



Thar Radial Wheel Grinders



Thor Surface Grinders

LOOK AT THE RANGE!

Number of Models ... Wheel Capacities 11/2" to 8" dia. Speeds3000 to 21,000 RPM Weights18 oz. to 24 lbs.



Old span on Chicago & Northwestern Rel way replaced with precast concrete slok Note that original abutments remain in service with new parapets and bridge see

24-inch precast octagonal concrete pile bents in place under old through girder span bridge ready to receive precast concrete slabs.

Economy in Large Pile Concrete Trestles for Bridge Replacement

Economical concrete pile bents and precast concrete slabs will expedite replacement of inadequate bridges or trestles.

Piles are driven between old girders or stringers without interrupting traffic, and precast slabs are usually set between train movements without affecting schedules.

Precast slabs made to standard draw-

ings, as well as piles and bearing blocks, can be prepared during winter months, ready for immediate use when needed.

Our engineers have worked with railroad engineers to develop casting yard and field construction procedure. Their assistance on concrete design and construction problems is available to you without obligation.

PORTLAND CEMENT ASSOCIATION, Dept. 4-27, 33 W. Grand Ave., Chicago 10, III.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

BUY MORE WAR BONDS

For lack of the A BATTLE COULD BE LOST

• But we hasten to add, it hasn't. Already the magnificent battle the railroads have fought through more than two years of war, is widely acknowledged. But today, with ties becoming "tighter" than steel, and labor shortages even worse, it is time to consider whether merely swabbing creosote on re-adzed areas is doing the job.

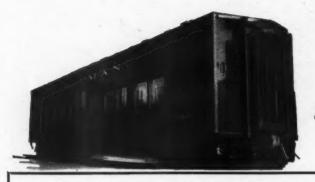
If you apply Osmoplastic, you assure protection because the toxic salts in Osmoplastic penetrate the moisture laden tie through "OSMOSIS", whereas creosote applied is immobile and merely coats the surface.

Anyone can apply Osmoplastic to a rail seat...a brush being the only equipment needed. The deep penetrating qualities of the toxic salts in Osmoplastic are well known and proven. Not only do they preserve, but they "case harden" the surface and prevent the tie plate from cutting into the tie.

If you are faced with a re-adzing program or the need to use untreated ties, we would appreciate an opportunity to explain the advantages of Osmoplastic.







Troop Sleepers lined with Douglas Fir Plywood

Uncle Sam needed troop sleepers-and quickly: The Pullman-Standard Car Manufacturing Company stepped in to do the job. And here, as in countless other war-time emergencies, durable Douglas Fir Plywood played an important part.

Built at a rate of 12 to 18 a day these Troop Sleepers are smoothly lined with strong, split-proof, puncture-proof plywood panels. In such jobs, plywood not only speeds construction and paint-work, but assures an attractive, sturdy finish as well.

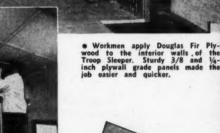


Douglas Fir Plywood gives this Troop Sleeper a smooth, attractive, durable lining that was easily applied and quickly painted.

Scores of railroad jobs are done better with Douglas Fir Plywood. Freight cars lined and ceiled with plywood protect ladings from dirt and moisture; use Plypanel or Plywall grades. Exterior type fir plywood for siding of box cars . . . and both siding and lining of reefers . . . provides tighter, stronger construction with less weight. Improve depots, too, with less weight. Improve depots, too, with plywood inside and out. Concrete bridges, warehouses and depots have smooth surfaces . . . go up faster . . . when formed against Plyform grade plywood. Write now for data on plywood uses.

Douglas Fir Plywood is now available only for essential war uses. After Victory, this Miracle Wood will serve you in countiess new ways.

Douglas Fir Plywood Association Tacoma 2, Washington



The Troop Sleepers have triple-deck berths and are designed to bring a new high in comfortable transpor-tation to our fighting men.



OLYWOLL ! WALLBOARD

SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

PLYPANEL DERA

EXT.-D.F.P.A.



DOUGLAS FIR

Raile

Prompt service given to users of Nordberg track tools an important factor in maintaining wartime traffic

Even with present day shortages and the difficulties encountered in securing certain materials, there has been no interruption in supplying repair parts for Nordberg track tools. Keeping existing equipment in operation has added to the availability of these tools, has helped meet labor shortage and by maintaining track in better condition has been a big factor in handling the increased traffic due to war. Users of Nordberg tools have found that this prompt service has been maintained in time of war just as well or better than it has been in time of peace.

NORDBERG POWER TOOLS. FOR YOUR TRACK JOBS

Adzing Machine
Track Wrench
Surface Grinder
Flexible Arm Grinder
Power Jack

Spike Puller Rail Drill Utility Grinder Midget Grinder Track Shifter



MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

Get Wise to the importance to you of cletrac Tru-Traction



- 1. Power on both tracks at all times.
- 2. Move smoothly around curves.
- 3. Consume less power on turning.
- 4. Steer the same downhill as on the
- 5. Turn shorter with full loads.

- 6. Maneuver on side hills parallel to slopes.
- 7. Stop and hold larger loads on hills.
- Handle off-center loads with least trouble.
- 9. Operate with power always applied.

ONLY CLETRAC Tru-Traction GIVES YOU THESE ADVANTAGES

CLETRAC Tru-Traction—controlled differential steering—was designed and developed by Cletrac more than 25 years ago. It is an advantage exclusive with Cletrac tractors but has been employed by the armed forces in high-speed, track-laying military vehicles where its value has been proved on countless military operations in which other types of equipment would have lacked the necessary maneuverability or might stall and bog down.

Isn't it sensible, then, to apply this same kind of power—Cletrac Tru-Traction—on your jobs?



GET THE FACTS FROM THIS BOOK

Ask for Bulletin No. 937 for complete details of Cletrac Tru-Traction and how it operates.

THE CLEVELAND TRACTOR COMPANY . CLEVELAND, OHIO



CLETRAC Tru-Traction TRACTORS

GASOLINE OR DIESEL





For Longer Rail Life Specify Oxweld End-Hardening

 Mechanized Oxweld end-hardening produces batter-resistant rail ends. It reduces the amount of work required for joint maintenance and makes rail last longer.

You will find it economical to include this process in your relaying program. Oxweld equipment is light and mobile, so that work can be done under traffic without delaying

trains. Oxweld advisers will help you plan your program.

THE OXWELD RAILROAD SERVICE COMPANY

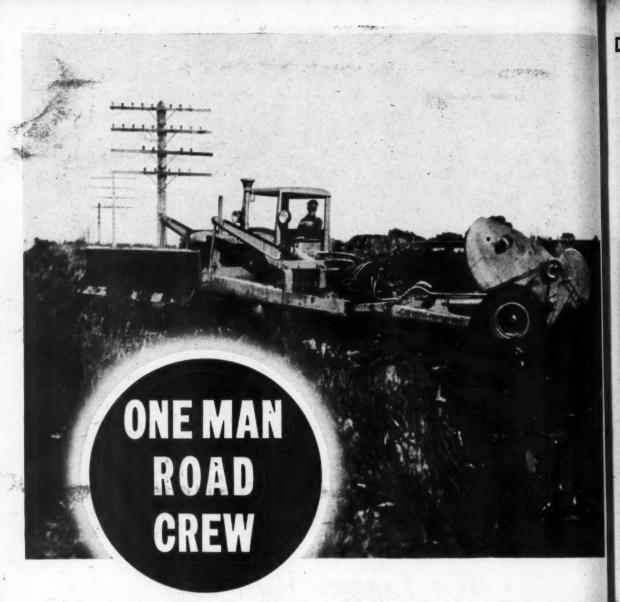
Unit of Union Carbide and Carbon Corporation

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Carbide and Carbon Building Chicago and New York



SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS



Regardless of the critical labor shortage and greatly increased traffic . . . right-of-way construction and maintenance can be kept up. You can do it with the one-man operated off-track outfit . . . the 2-cycle Diesel tractor with a bulldozer and scraper. This outfit is a crew in itself.

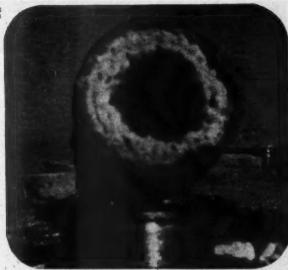
Designed to lick any type of tough dirt-moving . . . it is simple for the 'dozer to clean up a slope slide or wider ditches and push the material up on the undermined road bed. Also handles any heavy clearing — easily knocks over large-sized trees, uproots stumps or big boulders.

Equally efficient is the 2-cycle Diesel and 2-whell scraper. It is ideal for any cut and fill work when the material has to be hauled. Digs, carries, readumps — puts the dirt where you want it, up a slope or around ordinarily hard-to-get-at places. An exceptionally fast operating tool, it has countless applications.

Let these outfits help you solve your manpower problem. Call in your Allis-Chalmers dealer to discuss the type and availability of equipment most suitable to your needs.

ALLIS-CHALMERS

let us clean it for you



1,000,000 Gallons More Per Day through the same 12" Water Main by PIPE CLEANING

A Complete Engineering, Pipe Cleaning and Operating Service is offered to the Railroads by the Pittsburgh Pipe Cleaner Company.

Let Us Help Obtain

Increased pressure and flow
Lower operating costs
Greater fire protection
from your
present pipes and water mains



Railway Engineering at Maintenance

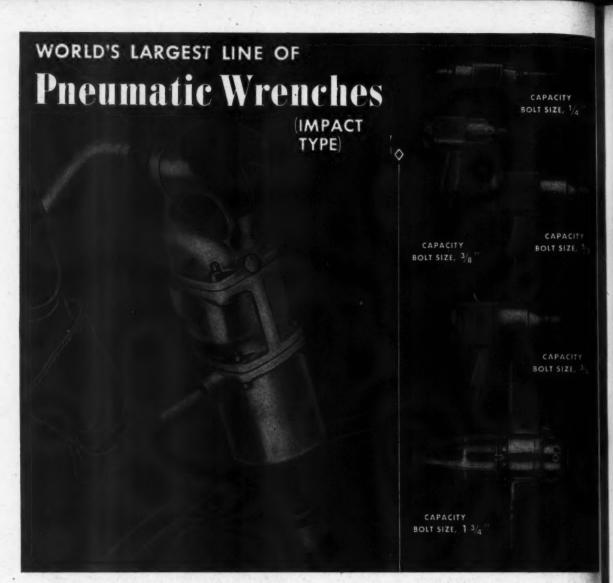


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PITTSBURGH PIPE CLEANER CO.

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Pittsburgh 13, Penna.



Few parts...low maintenance

Speedy...powerful...CP Pneumatic Wrenches (Impact Type) will remove nuts, bolts, studs—or apply them—in a fraction of the time required to do either job by hand. Available in six sizes to handle bolts, nuts, lag screws, studs. Illustrated above is the popular CP 365-RP, for bolts, nuts, etc., up to 1½" bolt size.

SPECIAL FEATURES OF CP PNEUMATIC WRENCHES

(Impact Type)

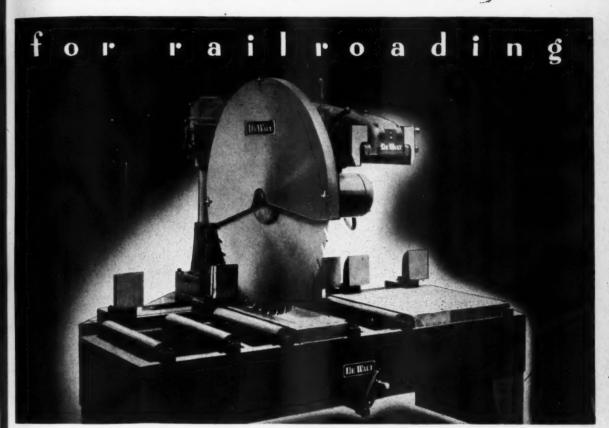
No Springs — No Gears
Few Parts — Low Maintenance
"Smooth-Flow" Clutch
Absence of Torque Reaction
Slow Speed — Long-Life Motor
Easy to Dismantle and Assemble
Perfect Balance — Easy Handling
Short Length — Light Weight
Angle Types Available in Capacities
of ¼", %" and %" Bolt Size





AVIATIO

DE WALT TIMBER CUTTER



Here's a timber cutting and tie-dapping machine that's saving materials, manpower and cutting time by pre-cutting lumber for bridges, buildings, ties, etc., right at the mill.

By using a roller-conveyor system, straight line production methods are possible. In this way, the rough timber enters one end of the line—the finished timber comes out the other.

Consider the savings you can effect in turning out miscellaneous timbers—delivered to the job ready for nailing. If such a set-up can help you, we invite you to consult a DeWalt field engineer. For complete information, address DeWalt Products Corporation, 4900 Fountain Avenue, Lancaster, Penna.





THE SANDUSKY, first engine made by Rogers, Ketchum and Grosvenor. It was finished in 1837, and was originally designed for a New Jersey line, but bought by the Mad River road of Ohio, when

THE MAGIC OF RAILS...

The introduction of rails, on which to move freight and passengers, marked the greatest single contribution to successful mass transportation. Nothing that preceded the rail could equal it for speed in the movement of heavy loads, nothing equals it today, and there is little prospect of anything supplanting it in the future.

The history of the improvement of rails is the history of the progress of the railroad. Its evolution from wooden timbers to straps of iron fastened to wooden stringers through counter-sunk holes, on to the "T" rail fashioned first of cast iron, then of malleable iron, wrought iron and finally of steel, is the record of ever-increasing loads moved at greater speeds. Distinguished engineers,

metallurgists, and maintenance experts, all contributo this gradual improvement, and their efforts have sulted in the incredibly efficient operation of our Asican Railroads. fect

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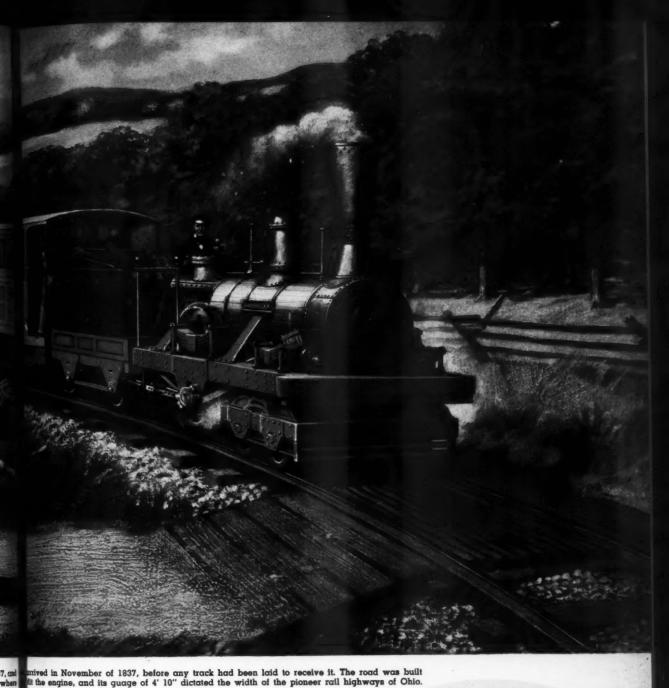
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Fair

As long, stream-lined, luxury trains sweep over shint rails at more than a hundred miles an hour, or a freight trains of one hundred or more cars roar than the country with produce and the munitions of a America enjoys the benefits of all the knowledge, inguity, and perseverance that have gone before to a our railroads a vital element in the massing of mental materials to preserve freedom.

Even the scientifically constructed roadbeds, and

OF ALL THE CARS IN SERVICE TODA



mived in November of 1837, before any track had been laid to receive it. The road was built fit the engine, and its guage of 4' 10" dictated the width of the pioneer rall highways of Ohio.

fected rails need constant attention. It is essential to safe and continued performance. Mobility of maintenance crews has been greatly enhanced by the use of Fairmont Motor Cars. Their dependability, efficiency and durability is a matter in which the makers take a jealous pride as their earnest contribution to the great task of American transportation. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

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airmont RAILWAY MOTOR CARS



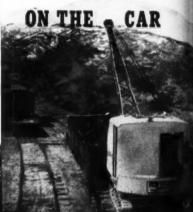


M9 Series D—1-2 man Inspection Car with spring mounted chassis for smooth riding. Light, safe, flexible and economical. Powered by Fairmont's famous 5-8 H.P. RO Hy-Load Roller Bearing Engine. Full details, Bulletin 391.

FAIRMONTS

DOES THINGS no owner type of maintenance machine can do!





T works from the car on the tracks like a track crane—but it does more than a track type crane—it unloads under its own power to work anywhere on the division, in many cases allowing the train to go on and clear the line. It can even be taken to the job on a highway trailer eliminating putting the work train on the

Here is a machine that can handle steel or timber, drive piles, dig ditch, build up line at all.

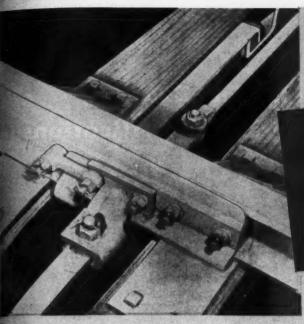
sinking track, trim bank, build out shoulder, handle ballast—a hundred and one things confronting your maintenance of

No track type crane can approach the versatility of a Northwest Crawler Crane. way forces every day.

You have big plans for better operation in the future. Add a Northwest to your plans for your toughest section. It's a proved unit by the country's leading railways. Let us send you more details.

NORTHWEST ENGINEERING CO., 1713 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.

PROVED RAILROAL



Point attachment showing locking rod clamped to switch points.

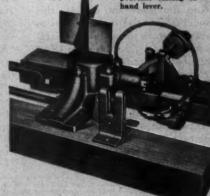
RACOR SWITCH BUILDING

When you install the RACOR Switch Point Lock, you safeguard trackwork and rolling stock, as well as lading, and avoid unnecessary interruptions to traffic. The Racor Switch Point Lock protects the switch, even if the stand is knocked down. Its mechanism is entirely separate from the stand and located below the top of the ties, thus reducing the possibility of damage from outside means.

Other outstanding Racor Switch Point Lock features:

- 1. Easy installation and maintenance.
- 2. Simple and accurate adjustment.
- 3. Convenient treadle release, which does not delay opening of switch.
- 4. Direct clamping of locking rod to switch points.
- 5. Impossible to insert padlock unless switch is properly closed.

Style 2012 for Ground Throw Stands. Note that one padlock provides positive locking and prevents raising of hand lover.



Style 3911 for High Stands—normally padlocked as shown but hand lever may also be padlocked or simple interlocking means provided.

Send for this comprehensive booklet, complete with diagrams and other interesting data.

Brake Shoe

RAMAPO AJAX DIVISION 230 PARK AVE., NEW YORK



ULBURN, N. Y. - NIAGARA FALLS, N. Y. - CHICAGO, ILL. EAST ST. LOUIS, ILL. - PUEBLO, COLO. - SUPERIOR, WIS. - LOS ANGELES, CAL. - SEATTLE, WASH. - NIAGARA FALLS, ONTARIO

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TO be fit for service—"1-A"—
in the merchant marine, this
model 6A Sheppard Diesel had to
measure up to the tough specifications of the U. S. Maritime Commission—for example, 25%
overload for 2 hours. It had to be
as good as it is to make the grade
with the Commission... and with
Ingalls Shipbuilding Corporation.

Ingalls uses these dependable, compact Sheppard 6A's as genera-

tors because they can handle any and all types of auxiliary generating jobs on any and all types of vessels. But these 6A's also give "A-1" service in refinery, quarry, mine, factory and general installations.

There's a reason for Sheppard versatility. To begin with, the Sheppard 6A packs a lot of power into a minimum of space. It's reliable, too—you can depend on it to

deliver 25 H.P. at 1200 R.P.M. under any operating conditions. What's more, the fuel injection system is simplified to stay out of trouble. And, like every Sheppard Diesel, it comes ready to install without makeshift additions... in new equipment... in converted units.

If you want the most efficient, most economical power you can buy ... and that's Diesel power ... get ready to shift to Sheppard Diesels!

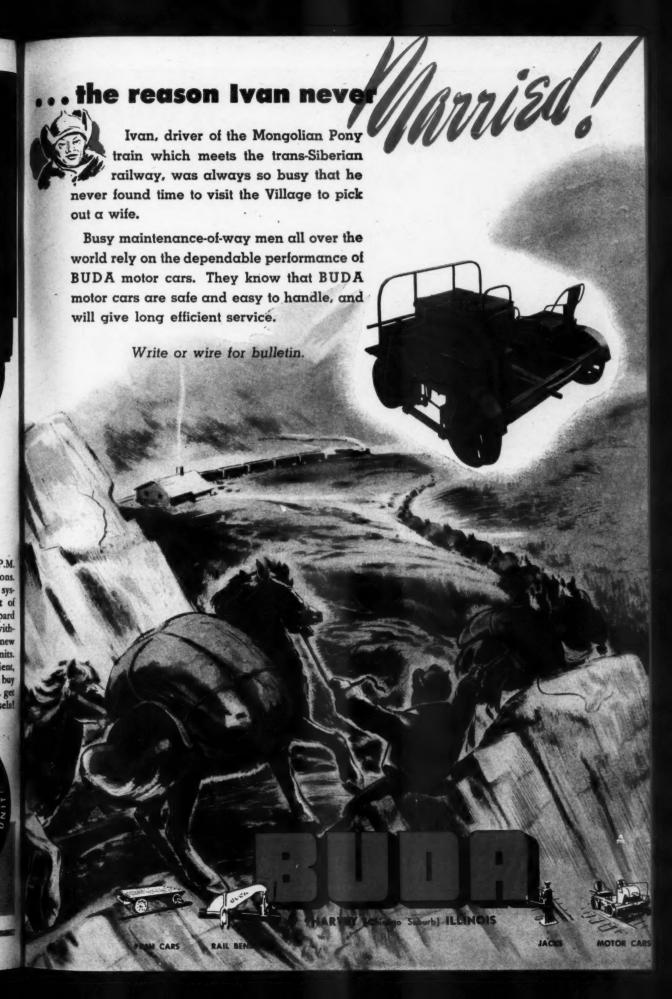
Sheppard works for V-Day in two ways. We devote most of our production to speeding its arrival. We devote much of our thinking to meet the future with its enormously expanded demand for efficient, economical Diesel power, Sheppard engineers are prepared to belt you plan ahead. Write for information and illustrated data sheet on the Sheppard Model 6A today.

R. H. SHEPPARD COMPANY, HANOVER, PA.

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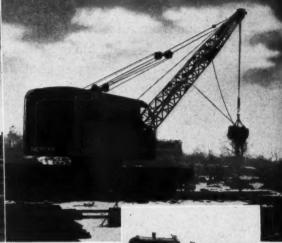
Batteries

Power take of arth clutch of the company of the comp



American MATERIALS HANDLING FOR EVERY INDUSTRY





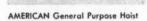
TWO AMERICAN L'OCOMOTIVE CRANES IN RAILROAD YARDS

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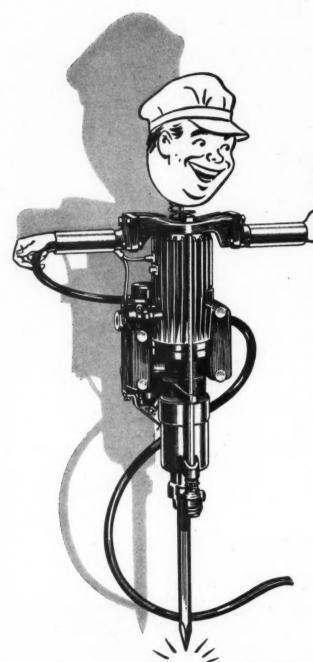
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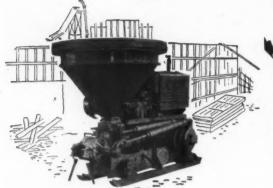
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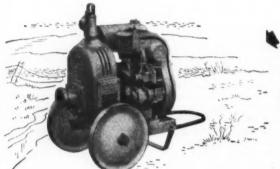
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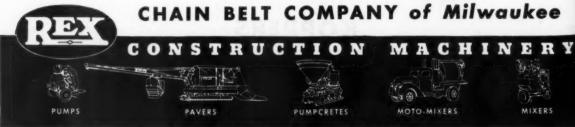


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Railway Engineering and Maintenance

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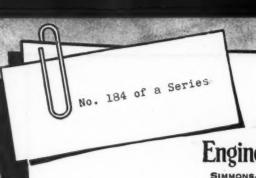
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Railway Engineering and Maintenance

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Subject: A New Series of Articles

April 1, 1944

Dear Reader:

In this issue we are publishing the first of a series of perhaps 15 or 16 articles on The Maintenance of Water Supply Facilities. Others will follow monthly until the series is completed. They will treat in turn of sources of supply (reservoirs, wells, etc.), intakes, suction lines, pumps (of various types), power units, valves and hydrants, water columns, tanks, water treatment, tools for gangs, etc.

These articles are being written from the point of view of the water service foreman and his immediate superior; as such, we believe they will also be of scarcely less interest to all other railway officers concerned with the operation and maintenance of water service facilities. They will present the problems arising in the upkeep and repair of these facilities and good practice in their solution, with considerations of design limited to those necessary to a clear understanding of the nature of the work of maintenance.

These articles will "blaze a new trail" in railway water service literature. They will meet a long-felt need, for there is almost no literature available to the water service repairman today.

The author, Clarence R. Knowles, is known to many readers of Railway Engineering and Maintenance, for he has long been a contributor to our columns on water service subjects. He served as a water service repairman, foreman and inspector of water service for 16 years and then as system superintendent of water service for 27 years, all on the Illinois Central. He was chairman of the American Railway Engineering Association's Committee on Water Service for 8 years, has served as a director of the American Water Works Association and was editor of the Water Service Section of the 1926, 1929, 1939 and 1942 editions of the Railway Engineering and Maintenance Cyclopedia. In these various capacities he has come to be recognized as an authority in water service matters.

We believe that these articles will comprise a valuable contribution to the literature on water service. We suggest, therefore, that you save the issues containing them. If the demand warrants, we will republish them in convenient book form on their completion. We shall await your reaction to them with interest.

Yours sincerely,

Elmer T. Houson

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Editor

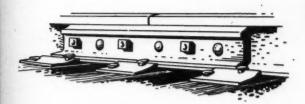
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Railway Engineering and Maintenance

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Railway Engineering and Maintenance

Co-operation

of Employees With Their Railways

The railways are now at the threshold of another active season of maintenance of way and construction work. The tasks awaiting them are of record proportions. And this work is of pressing importance for it is related directly to the nation's all-out effort to bring the World War to a successful conclusion.

There are numerous indications that the scarcity of materials is easing somewhat in some quarters. Especially is this true of steel, for the railways have been advised that they may expect to receive practically their full askings for rail. Similarly, manufacturers of work equipment have been advised that aluminum will soon again be available to them. These relaxations of restrictions may be expected to expand as the season advances. Ties and lumber and some types of work equipment now present the only major contrasts in this outlook for materials.

In respect to labor, the outlook is far less reassuring. The inroads of the war, both directly through the induction of millions of men into the armed forces and indirectly through the enticement of many others into munitions and allied plants, are acute and daily becoming more critical. As the season advanced last year, shortages appeared in many areas until they were almost universal by the time winter closed in. Now, the inadequacy of the forces is still more pronounced. Everywhere, the magnitude of the programs that can be undertaken is being limited by the number of men who can be secured, for materials have given way to labor as the determining factor. And the outlook is that the shortages will become more acute as the season advances. Brotherhoods Promise Co-operation

To cope with this problem, a new development is in the making, the results of which will be watched with interest. It involves the enlistment of the railway brotherhoods actively in the effort to recruit the 100,000 workers needed to fill present and impending vacancies on the railroads, the larger proportion of which are in maintenance of way activities. This is being made effective through the organization during the last month of the Railroad Mandower Mobilization Committee, a co-operative agency of the Brotherhoods, the A.A.R., the O.D.T., the War Mandower Commission, the Railroad Retirement Board and the Office of War Information. This joint participation marks a new development in railway-employee relations. Having settled their differences regarding wages, they are now uniting in efforts to draw into the service the additional men necessary to apply the larger quantities of materials that are becoming available and to do the other work that is so urgently demanded.

There is much that employees can do in this direction. This is true particularly of those in maintenance of way service, for they are located in every hamlet and village throughout the country. Railway work has much of attraction in any day—this is particularly true today when roadway maintenance takes on the nature of war work. It is to be hoped that maintenance of way employees will give their active support to this co-operative plan for recruiting labor. It provides an interesting test of employee cooperation. Its success will be watched with interest for evidence of the possibility for further co-operation in other directions.



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Employees—

New Types Demand Special Consideration

THE coming summer will find a number of new types of track labor on many railroads. Among these will be Mexicans, Indians, high school boys, white-collar workers and women. There appears to be no hope of the railways being able to secure war prisoners for maintenance of way and structures work, even if such was desirable, which is questioned by many.

A number of roads have already had experience in the employment of Mexicans and high school boys, who will form the bulk of the new labor available in the months ahead, although most of them have not, at least to any considerable extent. For these latter roads, the success of their experiments with these new types of employees may well depend upon the extent to which they profit by the experience of other roads. With this thought in mind, every supervisory officer who may have to deal directly or indirectly with Mexicans and boys during the coming summer should take advantage of every opportunity to learn of the experience of other roads, through direct contact with the officers of these roads, where possible, or by studying the public statements of these officers relative to this matter. Two of the latest statements on this matter were made before the annual meeting of the American Railway Engineering Association in Chicago on March 14, by T. A. Blair, assistant chief engineer of the Atchison, Topeka & Santa Fe System, who addressed the meeting on the Employment of Mexicans, and by W. G. Powrie, engineer maintenance of way of the Chicago, Milwaukee, St. Paul & Pacific, who spoke on the Employment of High School Boys. A third address, discussing the over-all labor situation and ways and means of meeting the acute shortage in prospect, was presented by H. L. Carter, director of the Bureau of Employment and Claims of the Railroad Retirement Board. Abstracts of all three of these addresses appear in this issue, beginning on page 344.

As pointed out in these addresses, there are two highly important phases to the successful use of Mexican Nationals and high school boys in maintenance work. The first of these is the proper approach in hiring them to avoid subsequent misunderstanding, and the second is the handling of them on the job in such manner as to avoid discontent, indifferent results, poor safety records, absenteeism and quits. The importance of the latter phase cannot be stressed too much. Many of the things that are essential in the proper handling of both Mexicans and boys are self-evident, or should be, to anyone experienced in the hiring or supervision of others, but some, especially as they apply to boys of the ages of 16 and 17, are not. These can be learned the hard way, with the attendant difficulties, or they can be avoided entirely by heeding the experience of others.

Most maintenance officers recognize that good, wholesome and sufficient food is one of the essentials to contented employees. It should be self-evident that Mexicans demand special foods and seasoning, but it may not be so apparent that boys demand food differing in many respects from that suitable for full-grown trackmen, and, unless recognized early, can lead to dissatisfaction, absenteeism and wholesale quits. One road which employed a large number of boys last summer experienced considerable dissatisfaction among them initially because of failure to keep its commissary stocked with candy bars. The matter of food was not overlooked even at the start, but the changes made from the usual labor camp fare had not gone far enough, and many of the boys quit after the first or second week—one of them expressing the feeling of the group when he said that he was going home to get "some of his mother's cookin's"

Such things may appear trivial in the face of the larger factors involved in building and maintaining an adequate labor force, but, in an attempt to bring about greater stabilization of employment among track workers, which is one of the most important problems of the present labor situation, it should be remembered that it is often the small things that count most.

Changes—

Maintenance Officers Must Meet Them

PROBABLY no generation of railway men has seen so many or such drastic changes in maintenance practices as the present one. In the past, changes were generally gradual and occurred only over long periods. Yet there are many men in railway service today who have seen an almost complete change-over from the manual methods to mechanization in maintenance; who have seen untreated timber bridges give way to creosoted structures with several times the service life of the former; and who have seen "permanent" materials substituted for timber and lumber in many classes of buildings.

On some roads, as a result of preservative treatment, tie renewals have been reduced from 600 or more a mile a year to around 60 or 70. Creosoted trestles may be expected to last 30 years, and there are structures that are much older. Likewise, brick and concrete buildings, with tile, concrete, terrazzo or asphalt floors, sted sash, gravel or asbestos-shingle roofs, and other permanent or semi-permanent materials have replaced many of the all-wooden buildings of former days.

Obviously, these and other equally important changes have had far-reaching effects on methods of doing work. While the outward form of the organizations for handling maintenance of both track and structures has persisted with considerable tenacity, many changes are taking place within these organizations, such as longer sections with skeleton section gangs, the supervisor system of track inspection, specialized track gangs, etc.

As a result of the trend toward more permanent construction for bridges and buildings, there has been a marked reduction in both the volume of current repairs and the number of structures to be renewed in any year, and a corresponding reduction in the size of the forces needed to do the work. Formerly, no one thought it possible for a bridgeman to do any of the highly specialized jobs incident to building work, and it was considered almost ridiculous to suggest that a house carpenter, a cabinet maker or a glazier could find employment in a bridge gang. Yet, today, the volume of work on many districts does not warrant two gangs, and it has been found feasible to consolidate them by equipping the surviving gang with a complement of power tools that will enable it to do both bridge and building work.

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In general, maintenance officers and the men themselves have found the change quite satisfactory, although in most cases it has been necessary to retain a small group of the more skilled building men to make minor repairs, particularly to the interior of offices and stations, and a tinsmith to look after gutters and downspouts. New conditions are requiring a new approach to the problems that have arisen, and both officers and men are adapting themselves quickly to the new requirements.

Welding-

Must Emphasize Hazard of Fire

ONE of the most serious forms of economic waste on the railways as elsewhere is fire. Although serious as a destroyer of valuable materials at any time, fire is doubly serious in wartime because every piece of critical building material that must be replaced, must be drawn from stocks that are already inadequate for war or allied purposes. In addition to the possible loss of life, fires also waste the labor that is required in reconstruction, cause the destruction of valuable, if not irreplaceable equipment, machinery or stores within buildings, and frequently still more serious, the disruption of indispensable services.

Nowhere are all of these factors more likely to be involved than in fires in important railway buildings, and especially in enginehouses, the heart of every engine terminal. Here, fire can not only lead to the destruction of essential facilities within the building itself, but, as has been demonstrated on several occasions in recent years, the destruction of many times the value of the building in locomotives. With such a catastrophe always a possibility, nothing should be left undone to prevent fires in enginehouses. No precaution is too small to be overlooked.

While there are many potential causes of fires in and about enginehouses, one that has become more pronounced in recent years has arisen from acetylene welding and cutting operations, which have expanded greatly in both building construction operations and in making repairs to locomotives. This was emphasized recently by one of the most serious enginehouse fires in the history of the railways, which was attributed to sparks from welding operations—a fire that not only destroyed 33 stalls of a 42-stall house, together with an adjoining machine shop and water softening plant, but also seriously damaged 23 locomotives as well.

No one would suggest, especially in these times, that the welding and cutting torch be given up because of the fire hazard involved in its use by careless operators. However, it is imperative that carelessness on the part of operators be reduced to the minimum, and that cutting and welding operations be safeguarded by all practicable means.

Most roads have not been unmindful of this, but the fact that carelessness or thoughtlessness in welding and cutting operations continues to cause fires and threaten more, is an indication that the tasks of education and of providing suitable precautions have not yet been completed. Recognizing this, the International Acetylene Association has issued a 16-page, pocket-size book-

let entitled Preventing Welding and Cutting Fires, which, written in an easy-to-understand style, contains brief, clear discussions of the chief causes of fires, and presents practical, common sense measures for preventing them. This booklet has nothing to sell but safety, is distributed free, and, regardless of other literature that may be available on the subject, should be placed in the hands of every welding and cutting operator. This is especially important in these days which have required the breaking in of many new operators, and which still require that men with little experience be called upon at times to carry out important work.

Labor and the Draft-

Government Policy Considerably Toughened

REQUIREMENTS of the armed services, business, industry and agriculture will mount from 61,200,000 to 65,700,000 persons by July 1, 1944, an increase of 4,500,000 in the total labor force, according to a recent report of the War Manpower Commission. This increase consists of 800,000 more men in the armed forces, 3,400,000 more persons in agriculture and slight gains in employment in transportation, fuel, utilities, etc. This latest analysis of manpower requirements has resulted in a threat of general tightening-up of occupational deferments and of reclassification of many previously deferred, particularly in the age group from 18 to 26.

This is a considerable change from former selective service policies and if the new "tough" attitude is based on real need and administered with justice and reason, no one can object to its application, although it is natural to wonder, if the need is as great as it apparently is, why the administration of selective service was not "toughened" some time previously.

It may be possible to eliminate deferments in some industries in which, although critical a few months ago, we are "now over the hump." But this situation does not apply to the railroads. With the working season approaching, with traffic heavier than ever and with available manpower lower than ever, the application of a ruthless draft policy to the railroads is not within the bounds of reason. They are, more than ever, the most critical of the agencies supporting our war effort.

The railroads have pleaded their cause time and again at Washington and before individual draft boards. Except for common labor, their men have been granted deferments by most boards. Apparently, however, railroad men will get little special consideration under the new selective service policies. The situation is dark. In view of the importance of the railroads, they should get special consideration and efforts will be made by those in authority to remedy this situation.

In the meantime, every source of manpower must be combed to fill up the ranks and prepare for the coming working season. Many expedients that have been used with considerable success during the last year were discussed in detail by three speakers at the recent American Railway Engineering Association meeting in Chicago on March 14. An abstract of these addresses appears in this issue and a careful study of the expedients presented therein may help others meet their manpower problems.

The following includes abstracts of three addresses on the labor problem, presented in a symposium before the annual meeting of the A. R. E. A. in Chicago on March 14. The speakers were H. L. Carter, director, bureau of employment and claims, Railroad Retirement Board; T. A. Blair, assistant chief engineer, A. T. & S. F. System; W. G. Powrie, engr., maintenance of way, C. M. St. P. & P.

The Over-All Labor Picture

By H. L. Carter

Director, Bureau of Employment and Claims, Railroad Retirement Board, Chicago



THE Railroad Retirement Board has become the agent of the government primarily responsible for both the recruitment and stabilization of railroad manpower. In carrying out

these responsibilities, the board needs the full co-operation of railroad management, organized labor and all interested government agencies.

At the moment, the co-operative efforts of all interested parties should be turned toward the stabilization of employment. Nearly enough employees were hired by the railroads during the last two years to man the entire industry. Specifically, in the maintenance of way department, it is estimated that almost as many employees were hired in the calendar year 1943 as were in the employ of the railroads in the peak month of September, 1943. As the report of your Committee on Labor indicates, the continual turnover which is evidenced by these figures has kept maintenance of way gangs "in such a chronic state of disorganization that the actual output has been well below

the potential output of a permanent force. . . ."

To a considerable extent, Selective Service withdrawals account for some of the serious losses of experienced and qualified railroad employees. According to information published in the Railway Age, Selective Service took approximately 270,000 railroad employees up to the end of 1943. The future appears to hold very little prospect for the diminution of such withdrawals. The Association of American Railroads estimates that at least 50,000 more workers will be lost in the first six months of 1944. and that for 27 Class I railroads, 12,776 additional maintenance of way employees are scheduled for call.

In the last analysis, regardless of what may be done nationally to secure special consideration of the selective service problem of the railroad industry, the problem is one with which the local boards and state offices can be of help if they are convinced of the importance of railroad workers to the war effort and of their irreplaceability. In this connection, the board's employment service is in a position to furnish Selective Service local boards and state offices with information on the possibilities of obtaining replacements, and the importance to the war effort of railroad skill and experience. Railroads should, therefore, feel freeto call upon the board's employment service for assistance when requesting deferments and when preparing replacement schedules.

The Critical F What Can Be

The losses of the more highly skilled employees through Selective Service withdrawals, as well as their transfer to other industries, could be cut to some extent by the addition of many more railroad occupations to the so-called national list of critical occupations. The present railroad positions on this list are incomplete and misleading, since many railroad job titles do not appear on it. The board has made suggestions for the amendment of the national critical list to appropriate government agencies.

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Must Stabilize Forces

Fully as important as the losses due to Selective Service are the losses of casioned by transfers to other employment. Except for those effected for such reasons as personal hardship, the War Manpower Commission stabilization program is intended to prevent these losses by requiring, as a condition for obtaining new employment, a statement of availability or a referral by one of the government employment offices. The program has helped prevent the loss of skilled and semi-skilled employees, but the casual laborers, few of whom have permanent home or family attachments and customarily move from job to job # will, are still leaving the railroad industry in large numbers.

The stabilization program of the WMC has a number of loopholes which permit employees to change employment without control:

First, transfers may be made to agricultural employment without either a statement of availability or referral. Second, employees who have remained out of work in essential activity for the last 60 days may obtain new employment without a statement of availability and are entitled to a referral if one is required for new employment. Third, any employer who is discharged by his employer is automatically entitled to a statement of availability or referral.

But even if the weaknesses of the program were remedied, the employment stabilization program of the WMC is only, at best, a preventative and not a cure. A man denied a

Factor Ahead Done About It?

statement of availability or a referral is nonetheless dissatisfied, if he is required to stay on his job. This makes it all the more important to root out causes for resignations.

Take Advantage of Incentives

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Wages have, of course, been an important factor in causing quits and resignations, and a factor over which management has little or no control at the present time. While there is little or nothing that railroad management can do about raising the wage rate, much has been done in other ways to increase the net income of maintenance of way employees. Some measures which have already been taken include a reduction of charges for board, with the railroad company assuming part of the cost; paying trackmen for the time spent in going to and from job location; providing a considerable amount of overtime; and furnishing camp cars, section houses or other housing at no cost to the employee.

Of next importance to wages as a cause for leaving railroad employment is housing. Inadequate housing has made it difficult for us to recruit workers in many sections of the country for maintenance of way employment and has been a principal reason for applications for statements of availability at our offices. This seems to be borne out by the report of those participating in your study of means for increasing the labor supply, for they state that they are deeply impressed "with the need for improved housing and better sanitation at their labor camps, whether fixed or itinerant." In view of their urgent need for workers, the railroads should make every reasonable effort to provide housing for their employees at points where present accommodations are inadequate. If management would do no more than follow the recommendations of the Roadmasters' and



At the Moment, the Co-operative Efforts of All Interested Parties Should Be Turned Toward the Stabilization of Employment

Maintenance of Way Association,* a considerable amount of dissatisfaction over housing accommodations would be eliminated.

Food parallels housing as an important factor in keeping men on the job. In this connection, I can do no better than to refer again to the excellent report of your Committee on Labor. This states that "it is probable that in the past no feature of labor camps has been of more importance in recruiting and holding men than food and the way it was served." With this statement there can be nothing but whole-hearted agreement, for it is buttressed by all of the experience in the employment of such special groups as Mexicans, Indians and women.

In addition to providing more adequate housing and better food, it is suggested that consideration be given to providing recreational facilities for trackmen. Among the facilities which have proved helpful to some employers are recreational cars furnished with playing cards, checkers, radios, etc. For high school students, of course, baseball equipment, horse shoos, etc., have proved their value.

Much can be done to eliminate dissatisfaction among maintenance of way employees when they are required to remain at isolated locations for long periods of time. The remedy is week-end passes to the nearest town, or, when job locations are not too far away, daily transportation from town to job location and return.

The important factors in the stabil-

ization of employment discussed, require in general, a revision in thinking with respect to many practices of long standing. To bring about these changes, full-time officers should be appointed to devote their entire time to this stabilization problem. Such officers, like the Spanish-speaking railroad representatives in charge of the Mexican program on many railroads, should work closely with the Railroad Retirement Board and, wherever possible, should interview workers prior to their quitting or their discharge to determine the causes for their leaving. With the facts in hand, they should then make whatever adjustments are necessary to remove these causes.

Regardless of what is done by the railroads or what assistance is rendered by the board in preventing losses of manpower and reducing turnover, it will continue to be necessary to recruit large numbers of workers for the railroads. Positive, strenuous and ingenious efforts of soliciting manpower are required and, in addition, some knowledge of the governmental manpower controls.

Retirement Board Assistance

The Railroad Retirement Board can be of considerable help in avoiding the pitfalls of present labor controls if recruitment by employers is done

^{*}These recommendations were presented before the war-time Executive committee meeting of the association on September 15, 1943, and were published in Railway Engineering & Maintenance for October, 1943, page 768.

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through the board's officers. Use of the board's facilities will benefit the industry through the scheduling of recruitment in areas served by more than one railroad so as to avoid the competitive practices that sometimes result in those roads paying the highest wages getting all of the men.

The board's facilities can also be of help specifically in the following

ways:

(1) Advertising and Publicity— The board has distributed more than 900,000 copies of advertising material, and has engaged extensively in newspaper advertising. In practically all areas of the country, newspaper advertising for help is required to be cleared by the board under WMC regulations.

(2) Students—In accordance with arrangements being made by the board with school authorities to interest students in the educational, healthful, and recreational advantages of track work, it may be possible to obtain larger numbers of workers for summer employment than would

otherwise be possible.

(3) Veterans—The board now maintains close contact with veteran re-employment facilities, army discharge centers, newspapers, and the American Legion, in an attempt to interest as many veterans as possible in railroad employment. Many of these veterans may be secured for maintenance of way work.

(4) Agricultural Workers—The board has addressed more than 120,000 cards to box holders on rural routes and, in addition, extensive efforts have been made by its representatives in regions where agriculture is the basic industry, to obtain agricultural workers for the railroads during their between-season periods.

(5) Service Personnel—Arrangements have been made by the board, on occasion, to obtain members of the armed forces for emergency railroad work. However, since present military regulations permit their release for outside employment only in emergencies, members of the armed forces cannot be considered as a potential supply of maintenance labor.

(6) Transfers of Surplus Labor to Shortage Areas—Recognizing the fact that in certain areas of the country supplies of surplus labor are normally greater than in other areas, and also that because of unusual circumstances such supplies may develop any place in the country, the board has evolved methods whereby such supplies can be made known and utilized quickly in shortage areas.

(7) Recruitment at Off-Line Locations—Many railroads are now furaishing off-line transportation for men from practically any location in the country where workers may be found, with excellent results. In order for recruitment at off-line locations to be most successful, it is necessary that a representative of the railroad be present at the point of recruitment in order that hiring can be conducted on the spot, definite arrangements for transportation made, and supervision provided to the job location. In the absence of this arrangement, it is essential that some arrangement be made whereby the board's representative can obtain transportation for recruits from points of recruitment to job locations.

(8) War Prisoners—There has been considerable interest in the employment of war prisoners, particularly for maintenance of way work. It is my opinion that it will be impossible to obtain the use of war prisoners. The labor-management policy committee of the WMC has not yet approved the request of a single railroad for the use of prisoners of war, and it is not likely to do so, so long as the labor organizations are opposed to their employment and there is a question regarding safety precautions.

(9) Mexicans—The present ceiling for Mexican Nationals employed

in this country is 40,000, of which 18,348 are now in service in this country. It is expected that, at least by the middle of May, enough additional Mexicans will have been brought into the country to reach the ceiling of 40,000. The WMC is now acting upon the requests for Mexicans, and it is expected that within the next few weeks each of the individual railroads will know how many Mexicans it will be allocated.

(10) Puerto Ricans and Jamaicans—Experience has shown that Puerto Ricans and Jamaicans are not as useful workers as Mexicans, and railroad labor much prefers that Mexican Nationals be imported. There has been some discussion of the importation of Puerto Ricans for maintenance of way work, but none have yet been brought in and none are ex-

pected for railroad work.

(11) Indians—Experience in the employment of Indians has been successful wherever special thought and study have been given to their working and living conditions. The board has access to a supply of Indians, and when proper arrangements can be made for their use, consideration should be given to their employment.

High School Boys Help Fill Need*

By W. G. Powrie

Engineer Maintenance of Way, C. M. St. P. & P., Chicago



LIKE many other railroads of the country, the Milwaukee experienced a serious shortage of labor for maintenance of way work during the last year, a shortage that still exists.

Many section crews consist of the section foreman and only one or two laborers, and, at times, a few foremen have been without regular laborers. Even at this time of the year when our need for extra-gang labor is low compared with the summer working season, we have only 60 per cent of the force required.

During the last year, maintenance of way officers on many railroads have employed high school boys.

*Earlier and more detailed discussions of the employment of high school boys on the Milwaukee appeared in Railway Engineering and Maintenance for July, 1943 and December, 1943.

Some of these boys, 16 and 17 years old, have been employed in bridge and building work, some in section crews, and others in large extra gangs. Whatever these officers may have thought about the advisability or merit of using these boys in bridge and building or track gangs a year ago, they know now that a great deal of work has been completed by them which otherwise could not have been done.

Last year about this time our division maintenance officers called on the high school authorities in the villages and cities along their divisions and sought their assistance in recruiting boys for work on the railroad. Part-time work was offered in section gangs during the months that school was in session and fulltime work during the school vacation periods. By April about 500 boys had signed up for work, with about 200 already actually working week-ends. When the schools closed in June, the recruiting gained mo-mentum to the extent that we had more than 1300 minors on the maintenance of way payroll by the close of that month.

Where the type of work to be done

permitted, the boys were organized into large extra gangs and, in a few instances, camps were provided for them. These camps were made up of standard extra-gang outfit cars equipped with running water and electric lights. Shower baths were provided, and the camps were otherwise made as comfortable as possible. Meals were regulated to the boys' requirements. Generally, where the work was not too far from their homes, the boys were transported to and from work in highway busses rented for that purpose.

Careful Supervision

Proper supervision over the boys, both in the local gangs and those living in camps, received careful attention. Foremen were selected with care, an effort being made to provide supervisors with some natural ability to get along well with boys. In some instances school teachers or coaches were employed to act as monitors. In large gangs, an increased number of lead men and assistant foremen have been found desirable, but where only a few boys are employed in an otherwise stable section crew, no special problem has been encountered.

Because few of these young men have had any previous work experienced, their safety is a matter for real concern. When first employed, and daily thereafter, they must be instructed in safe working practices. They must be required to familiarize themselves with the safety rules and, each day before starting work, the foreman must impress upon them the importance of following those rules. In addition, the foreman must instruct the boys in the proper use of their tools. The only satisfactory Safety First record is, of course, a total absence of injuries. We did not reach that goal, but did have surprisingly few injuries among the boys, none of which was of a serious nature.

Our experience has shown that most boys 16 and 17 years old are willing to accept the full responsibility of railroad bridgemen or trackmen. A few of them do not learn the importance of that responsibility immediately, and may act on a sudden impulse to go swimming or to a ball game, but no mischief is intended.

Excel With Power Tools

In general, the turnover and absenteeism in the boy gangs was much lower than in those gangs made up of regular transient extragang men. Furthermore, the quality

of the work done by the boys is satisfactory. It is especially noticeable that they like and excel in the handling of any type of power tool.

While the progress made by some of our boy gangs was slow compared with what might have been made by a gang of experienced trackmen, the boys completed many jobs for us that otherwise could not have been done. Many of the boys, distributed in small numbers among the section crews, carried out general track maintenance work. In other instances, they were worked in groups of 50 to 100 in ballasting gangs, which complete a total of about 110 track miles of reballasting and surfacing work. In one case, a gang of about 100 boys, with the help of about 20 experienced trackmen, constructed a section about nine miles

long of new second main track. With the opening of the school semester last fall, we, of course, lost the services of the majority of the boys. Some of them, however, have continued working part time throughout the winter months, and we now have about 150 minors work-

continued working part time throughout the winter months, and we now have about 150 minors working on that basis. We are now making arrangements to employ high school boys during the coming summer on about the same basis.

I do not want to leave the impression that our labor problem can be solved through the employment of high school boys alone. It is a fact, however, that these young men can be used successfully in all of the classes of maintenance of way work where inexperienced help can be employed, and are a source of some relief to our labor problem.

Employment of Mexican Nationals

By T. A. Blair

Assistant Chief Engineer, A. T. & S. F. System, Chicago



RAILROADS in the Southwest pass through a sparsely settled territory, and for many years it has been their custom to import Mexican Nationals for extragang work. Mexico is the

logical source for additional workers in this territory because of the similarity in climatic conditions, and because of the large number of native Mexicans already living in the Southwest. Furthermore, the railroads in this area are familiar with this type of labor, and the Mexican Nationals know that they will be able to associate with native Mexicans in their new place of employment.

In general, Mexicans are not large in stature and, individually, do not have the potential strength of some of the labor that we have used in track gangs. The Mexican is a willing worker, however, and he likes to work as a member of an organized gang. Furthermore, he is intensely interested in mechanized equipment. Let one of them handle an air tamper, for example, and he will insist on staying with it.

Some of the Mexicans come from cities, where a part of them have been office workers. These men pre-

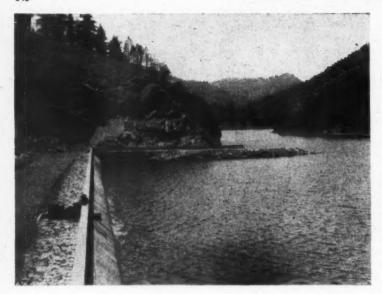
sent the same difficulties to our foremen as do similar workers from our own country. They are "soft" and do not know how to use hand tools, and must be instructed by demonstration how to handle themselves and their tools.

Only in rare instances have we received Mexicans with previous track experience, and even they must be instructed in the rudiments of track work. If this is done by actual demonstration, they will learn quickly and will endeavor to follow the demonstration to the smallest detail. Obviously, this requires patience on the part of the foremen, because it will be a week before he can expect these men to approach the normal output for a day's work.

On the Santa Fe, we have no problem in interpreting the English language to the Mexicans. Many of our foremen came from Mexico, and most of the others speak enough Mexican to make their orders understood clearly. Furthermore, the new Mexican Nationals, through contact with our native Mexicans, soon learn enough English to understand orders.

In territories other than the Southwest, where these conditions do not prevail, it will be necessary that each gang be provided with an interpreter. Americans with knowledge of Spanish will be helpful, but they will find that the Mexicans have many idioms not known to the average student of Spanish. This situation can be handled best by securing with the Mexican laborers enough men who speak

(Continued on page 359)



Maintaining

The First Requirement of Adequate Water Service Is Ample Sources of Good Water Supply

WATER constitutes one of the principal requirements of a railroad. It supplies the power required to propel the 40,000 locomotives which per-form the work of the railroads in carrying freight, passengers, mail and express. Water in one form or another, is essential to almost every phase of railway operation. It exceeds, in both volume and weight, all other materials used in the operation of the railroads. The amount of water consumed annually by American railroads approximates 750,000,-000,000 gal. To supply and make this water suitable for use at the thousands of points where it is required, is a large task; yet so efficiently and smoothly is the work of the water service forces done in supplying and conditioning the vast amount of water required, that few outside of those who supervise and operate the trains, and those whose responsibility it is to maintain the water facilities, realize its impor-tance and magnitude. It is a tribute and a compliment to the water service men of our railways, that their work is performed so well that it is

taken for granted.

Water, like air, is necessary to human life, and is so common that we have become accustomed to think of it, like air, as being free. Fortunately, water is plentiful in most parts of the country, but it is not always free in even its natural state, and it is far from being free when brought to the point of use.

It is necessary to draw upon almost every known source of supply to provide the water required in the operation of a railroad. Where natural supplies are not available, it may be necessary to raise the water from

wells deep in the earth, or store it in impounding reservoirs. An extensive system of pumping stations, pipe lines, tanks, and other storage and

Introduction

No. 1 of a Series

This is the first of a series of practical articles on the up-keep of railway water service facilities which will be presented in this and succeeding issues, and which will discuss in detail the factors involved in the use of various types of such equipment; current problems affecting the maintenance and repair of these facilities; and best or recommended practice in the solution of these problems. This first article is general and introductory in nature, while succeeding articles will discuss in detail sources of supply, intakes, pumps, pipe lines, tanks, water treatment, cranes, etc.

distribution facilities are required to deliver water from the various sources of supply to the many points where it is required.

Magnitude of Operations

It is estimated that nearly 17,000 water stations are in service on the railroads of North America, these stations being chiefly for locomotive

supply. In addition, water is required in more than 75,000 of the 360,000 buildings on North American railroads, including 1,500 power houses, 4,900 shop buildings, 4,000 engine houses, 5,000 offices, 10,000 freight stations and 59,000 passenger stations.

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According to figures given in Railway Engineering and Maintenance Cyclopedia, 1942 edition, the total investment in water service facilities in the United States is estimated at \$500,000,000, and for all the railroads in North America at \$600,000,-000. The same publication estimates the annual cost of providing water for all railway purposes, based upon I.C.C. statistics, as approximately \$40,000,000 for the United States and \$48,000,000 for all the railways of North America. The total average annual expenditures of the North American railroads for maintenance, operation and additions and betterments for water service, plumbing, heating and fire protection amounts to approximately \$54,-000,000 a year.

The Water Service Organization

Although the methods of handling water service are not uniform on different railroads, almost without exception, all phases of this important railway function come under the general direction of the engineering and maintenance of way departments. The exceptions are small short line railroads and a few railroads where the treatment of water for locomotives comes within the jurisdiction of the mechanical department.

On the majority of the railroads, the development and design of water service facilities are handled by the regular engineering department staff in connection with other engineering

Railway Water Service Facilities_

A Practical Discussion of the Problems Involved in Their Maintenance and Repair and of Good Practice in Their Solution

By C. R. Knowles

Superintendent Water Service (Retired)
Illinois Central, Chicago

work. Construction work is usually performed by the division forces or by contractors. Operation and maintenance are in charge of the supervisor of bridges and buildings or other division officers as a part of their regular assigned duties.

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On other railroads the work of developing and designing water service facilities is delegated to a member of the chief engineer's staff, who has little to do with the actual construction, operation or maintenance, other than to see that the plans are followed. On such roads the actual construction work, together with the operation and maintenance, comes under the jurisdiction of the principal division maintenance officer and the supervisor of bridges and build-

On some of the larger railroads, all water service matters are handled by a distinct water service organization, operating as a separate department of engineering. This department is responsible for the development, construction, operation and maintenance of all facilities pertaining to water supply.

The lack of uniformity in handling the water supplies on different railroads may be accounted for in part by the fact that until a comparatively few years ago, this feature of railroad operation was not considered important, because, with few exceptions, the quantity of water required was not great and the question of quality was given little consideration. Also, conditions vary between

different railroads. The mileage and the number of water stations are controlling factors; the density and character of traffic, the necessity for increasing water supplies and for improving the quality of the water must also be given consideration in determining the procedure to be followed in maintaining an organization for water supply. However, with the constantly increasing demands on railway water service, it is becoming more and more apparent that there are few railroads that would not be benefited by a more system atic and comprehensive method of handling this important feature of railroad operation.

Size of the Force

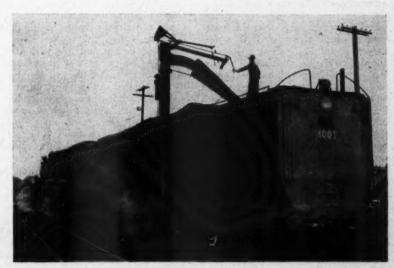
Regardless of any changes that may be made in the method of handling railway water service, the maintenance force need not be affected materially, as the water



C. R. Knowles

service men now employed in the maintenance of water facilities, form the nucleus of an organization, and the divisional set-up will remain practically unchanged, except that the duties and responsibilities will be more clearly defined.

It is impossible to present accurate figures as to the number of railway employees engaged in water service work, because of the many different methods of handling the work, and the designations or titles applied to those engaged in the work. Careful estimates place the total number directly engaged in water service at not less than 13,340. They may roughly be classified as follows: superintendents and engineers of water service 50; water service in-



In Recent Years, Larger Tenders and Longer Locomotive Runs Have Altered Water Service Requirements Substantially at Many Points

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spectors 90: office force 100: chemists 250; water service supervisors 250; water service foremen 600; supervisors bridges and buildings 600; water service repairmen and plumbers 2,300; water service helpers 1,-100; pumpers and treating plant operators 8,000. In addition, there are a large number who devote a part of their time to water service in connection with other duties, as for example, agents and telegraph operators, section and coaling station men, and others who operate pumping stations and look after the operation of water treating plants. Also there are approximately 500 water testers who check the concentration of dissolved solids in locomotives at engine terminals, bringing the grand total of those directly and indirectly connected with water service to around 15,000.

Perhaps the most exacting requirement of railway water service is adequate maintenance, as the uninterrupted movement of traffic depends largely upon the water facilities being maintained in first class condition at all times. While the maintenance of these facilities has always been important, it is doubly important that they be maintained to a high standard today when there is an increasing demand for more and better water, larger engine tenders and faster deliveries, together with train schedules that will brook no interference with train movements that have been stepped up to the tempo of a radio program; delays are no longer figured in terms of minutes, seconds are now the yardsticks; more complex and extensive water facilities have also added to the problem of maintenance.

Change in Requirements

It is a far cry from the water requirements of the first railroads to the exacting demands of today; when railroads were new, the water supply usually consisted of a few barrels mounted on a truck that was coupled to the locomotive. The barrels were connected to the boiler with a rubber or leather hose, and were filled by the train crew with buckets from whatever water supply happened to be available. (Today the weight of water carried in the tender of a single locomotive may exceed the weight of an entire train of the early days of railroading.) It was many years before the first rail-road found it necessary to put up a roadside water tank, and it was filled by gravity from a nearby spring.

Today, there are more than 25,000 tanks in regular service for the storage and delivery of water on the railroads. There are 32,000 pumps required at water stations alone, while the total number of pumps in all classes of service (including 6,000 hand and force pumps) is estimated at 146,000. Nearly 18,000 miles of cast iron and other underground pipe distributes the vast amount of water required, in addition to approximately 10,000 miles of other miscellaneous pipe in various uses.

The Water Service Repairman

Out of the progressive demand for ever-increasing improvements in railway water service grew a new classification in railway servicethat of water service repairman. The development, design and construction of water facilities involves questions of applied engineering and chemistry, but the maintenance of these facilities calls for special skill and ingenuity. Railway water stations are subject to deterioration and failure, like all machinery and equipment. Most of them are located at out-of-the-way places, remote from shops or other repair facilities. A breakdown, if not promptly repaired, will cause delays to trains and may even result in tying up traffic. It is here that the skill and ingenuity of the water service repairman is called upon, as he is expected to make such repairs as are required to keep the station in operation, regardless of the difficulties to be overcome, or the limited facilities available for re-

The qualifications of a water service repairman are exacting. He must have natural mechanical ability. good judgment, ingenuity and adaptability. A thorough training in all phases of water service work is essential. Many have their beginning as pumpers, advancing through the position of helpers, while others are grounded in the machinist, pipe fitting and sheet metal worker trades; some are drawn from bridge and building gangs and other depart-ments of the railroad. As with other branches of railway work, a multiplicity of terms are used to designate those engaged in the maintenance of water service facilities, among which are road mechanic, plumber, water works maintainer, tank man, pump repairer, and pipe fitter. For the sake of uniformity, and also because it seems more fitting, the term "water service repairman" will be used in this series of articles.

Water service repairmen report to the supervisor or foreman of water service or other division officer in general charge of water service, they are responsible for the safe, satisfactory and economical operation and

maintenance of all water facilities on the district or territory assigned to them. They have immediate charge of helpers, laborers, and all similar forces under them and exercise general supervision over pumpers or their assigned territory.

Responsibilities

Water service repairmen are primarily responsible for the maintenance of facilities required for the production and distribution of water for locomotives; however, on most railroads, they also maintain other facilities used in the distribution of water for all other purposes, as well as facilities of an allied nature, such as plumbing, heating and fire pro-tection, and in some cases, also air

The water station facilities include wells, pumps, pipe lines, tanks, water columns, track pans, windmills, and other facilities used in connection with water stations. General building and engine terminal water service maintenance includes plumbing heating, drinking water fountains hot and cold water lines, boiler washing facilities, and all other water facilities. Water service repairmen are also responsible for the maintenance of fire pumps, hydrants, hose and other facilities required for protection against fire, exclusive of chemical fire extinguishers and water buckets on bridges and platforms. Where water is purchased from outside parties, they are expected to check water meters and read them in company with municipal or other meter readers at such intervals as their other duties will permit. They must keep a careful check on tools and materials furnished them and know that they are properly used, making such material reports as their superior officer may require. Not the least of their duties is the prevention of waste or unnecessary use of water and the abuse of facilities by enginemen and others, functions of water service that are all too often abused.

Notwithstanding the importance of efficient water service maintenance to railway operation, little has been written on the subject other than information contained in the catalogues and other literature of the manufacturers. This series of articles is drawn from more than 40 years experience in railway water service work, much of which had to do directly with maintenance. They are presented with the hope that they may prove of practical value to water service men in general, and to others interested in this important phase of

railway operation.

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Pennsylvania and C. & O. Announce Track Awards

DURING 1943 the practice of making annual track inspections, rewarding or commending officers and foremen for excellence in track maintenance, was continued on several roads. Among these are the Chesapeake & Ohio, the Pennsylvania and the Norfolk & Western*. The results of the annual 1943 inspection on the Pennsylvania and the C. & O. are given below.

Pennsylvania

Following customary practice on the Pennsylvania, letters of commendation have been sent by their superior officers to those supervisors of track whose territories were maintained to the highest degree of excellence in 1943. The information on which the ratings were based was obtained by periodical inspections made during the year by special track inspection committees.

During these inspections, the territories of the various supervisors of track were rated for line, surface, and general improvement, and the letters of commendation were sent by their superior officers to the supervisors whose territories received the highest ratings. The names of the supervisors and their assistants (where they have assistants) who received letters are as follows:

New York Zone—New York division—S. M. Rodgers, Trenton, N. J., and G. T. Weida (assistant). Long Island railroad—W. L. Steltzer,

Jamaica, N. Y.
Eastern Region—Maryland division, main line—G. C. Vaughan, Wilmington, Del., and G. A. Sargent, Jr. (assistant). Maryland division, branch line—Norman Olsen, York, Pa. Middle division, main line—A. W. Miller, Huntingdon, Pa., and J. L. Spinelli (assistant). Middle division, branch line—D. M. Howard, Hollidaysburg, Pa. Philadelphia to Harrisburg, main line—L. W. Green, Philadelphia, Pa., and I. C. Golab (assistant). Philadelphia division, branch line—C. F. Parvin, Enola, Pa. Philadelphia Terminal division—W. G. Pfohl, Philadelphia, Pa. Delmarva division—J. E. Zullinger, Cape Charles, Va. Williamsport division—H. J. Lattomus, Northumberland, Pa. Wilkes-Barre division

-R. S. Dunkle, Sunbury, Pa.

Central Region—Entire region—J. P. McGhee, Coshocton, Ohio. Eastern division—R. L. Chaney, Alliance, Ohio. Pittsburgh division, main line—G. M. Sauvain, Trafford, Pa. Conemaugh division—R. E. Blosser, Kittanning, Pa. Monongahela division—R. G. Davis, Shire Oaks, Pa. Buffalo division—C. H. Frick, Struthers, Pa. Renovo division—G. W. Peoples, Kane, Pa. Panhandle division, branch line—A. C. Haines, Zanesville, Ohio. Cleveland division—C. G. Lybarger, Alliance, Ohio. Erie and Ashtabula division—J. C. Dayton, Sharon, Pa.

Western Region—Chicago Terminal division—W. B. Blix, Colehour, Ind. Fort Wayne division—Charles Weiss, Valparaiso, Ind. St. Louis division—W. R. Garner, Terre Haute, Ind. Columbus division—J. H. Ault, Dayton, Ohio. Cincinnati division—J. E. Chubb, Cincinnati, Ohio. Logansport division—P. Settle, Logansport, Ind. Toledo division—Darel Devore, Marion, Ohio. Grand Rapids division—Harry Hill, Cadillac, Mich. Indianapolis division—J. B. Hill, Indianapolis, Ind.

In addition, the track foreman of each supervisor's subdivision whose track was maintained to the highest degree of perfection during the year was commended by his superintendent.

Chesapeake & Ohio

On this road, it is the practice to make the annual track awards largely on the basis of records made by a special roadway inspection car. During peacetime it was the custom to operate the car over the system three times during the year and, during one of the trips, to incorporate it in a special train carrying general and local officers interested in the condition of the property. To provide the basis for making awards for excellence in track maintenance, the records made during the three trips of the inspection car were combined to give a single rating. In 1943, as in 1942, the special train was not operated due to wartime conditions. and the necessary data for making the track awards were obtained by attaching the inspection car to regular trains, in March and again in July.

So that the different territories on this road may be judged on a com-

parative basis, they are divided into five groups according to the character of the track and the class of traffic handled. These groupings are made on the following basis: Group 1-double-track main lines, freight and passenger traffic; Group 2 single and double-track main lines, principally freight traffic; Group 3single-track main lines, principally passenger traffic; Group 4—secondary branch lines; and Group 5-yard and terminal territories. As in 1942, lines in Group 4 were not inspected in 1943. However, the recommendations of local officers were used as a basis for awarding prizes to two sections of each district on such lines.

In Groups 1 and 2, prizes of \$50, \$40 and \$30 were awarded to the supervisors in each group who received the first, second and third highest ratings, respectively, while in Groups 3 and 5, prizes of \$50 and \$40 were awarded to the supervisors having the first and second highest ratings, respectively, in each group. In addition, a prize of \$50 was awarded to each of two supervisors -one in Groups 1 and 2, and the other in Groups 3 and 5-whose territories evidenced the greatest improvement during the year. Among the track foremen, prizes of \$25 and \$15 were awarded for the best and second best maintained sections on each supervisor's territory. The winning supervisors in the various groups are as follows:

Group 1—First prize—C. E. Butcher, Cincinnati district, Cincinnati division; Second prize—W. P. Nichols, Ohio River district, Cincinnati division; Third prize—J. H. Poindexter, Peninsula district, Richmond division.

Group 2—First prize—H. S. Chandler, Rivanna district, Richmond division; Second prize—J. F. Painter, James River district, Clifton Forge division; Third prize—O. C. Ewers, Paintsville district, Ashland division.

Group 3—First prize—G. E. Bostic, Mountain district, Clifton Forge division; Second prize—Charles Hetisimer, Miami district, Chicago division.

Group 5—First prize—F. P. Barrick (assistant division engineer), Russell division; Second prize—L. H. Lucas, Maumee district, Hocking division. It is interesting to note that the foregoing list of prize winners is the same in every respect as it was for 1942.

The improvement prize for Groups 1 and 2 went to W. C. Tipton, supervisor, Huntington district, Huntington division, while that for Groups 3 and 5 was awarded to G. E. Bostic, the winner in Group 3.

^{*}The Norfolk & Western awards were reported in the February issue, page 130.



Materials—Still a To Railway E

This is a report on a five-part symposium on Materials presented before the 44th annual meeting of the American Railway Engineering Association in Chicago on March 15. Included herein are abstracts of addresses by Albert C. Mann, director, Transportation Equipment Division, War Production Board; A. A. Miller, chief engineer maintenance of way and structures, Missouri Pacific; A. R. Wilson, engineer bridges and buildings, Pennsylvania; A. L. Sparks, architect, M-K-T Lines; and A. B. Pierce, engineer of water supply, Southern

The Picture, As Seen By WPB

By Albert C. Mann,

Director, Transportation Equipment Division, War Production Board Washington, D. C.



K N O W I N G that you are all interested in the immediate future of the materials and equipment situation, I shall try to point out the prospects in connection with the various major items in-

volved. I shall also endeavor to point out the policy of the War Production Board and of the Office of Defense Transportation which represents the transportation industry before that Board.

Undoubtedly the greatest deprivation you have experienced in your requirements for materials for maintenance work since Pearl Harbor has been with respect to new rail. In 1942 the railroads asked for 1,600,000 tons of rail, but received only 1,260,000 tons. In 1943 the request was for 1,800,000 tons, but allotment was made of only 1,539,000 tons. In mentioning the railroad request, I refer to the tonnage which the Office of Defense Transportation finally determined as minimum requirements and requested of the War Production

Board. In both 1942 and 1943 the actual rail deliveries by the steel industry were below the tonnages requested. We are encouraged to believe that in 1944 the situation will be better; at least the trend is in that direction.

The Office of Defense Transportation has asked for 2,200,000 tons of rails in 1944, and while the total tonnage allotted initially by the War Production Board was only 1,824,000 tons, that total has already been increased by an additional delivery of 40,000 tons in the first quarter and by an anticipated increase of 100,000 tons in the second quarter. We have reason to hope that the third and fourth quarters may each produce an additional 100,000 tons, so that the total tonnage for the year may reach 2,165,-000 tons, or substantially the amount requested by the ODT.

Along with the added rail deliveries, the War Production Board is trying to work out a simplified program whereby the railroads can secure advance validations of their orders for track fastenings and accessories. This will avoid some of the complications which have arisen in the past as a result of the ability of the Board to furnish rail beyond the quarter's original allotment, while the railways have found it difficult to get the steel mills to accept orders for the additional fastenings and accessories needed.

As regards the general steel situa-

tion, there have been reductions is some military programs, but this lower demand has been offset by the increased need for many non-military items, such as railroad equipment track materials, farm machinery, ga and oil facilities, and food contained. Increased allotments for these purposes are responsible for the fact that total allotments to claimant agencies for the second quarter of 1944 and approximately equal to those for the first quarter.

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A few producers have idle capacity as a result of lack of demand in their particular territories or for their specific products. However, a careful check of the order books of all producers indicates that the industry in general is well booked and will operate close to capacity throughout the first half of the year.

first half of the year.

The demand for plates and heavy sheets has continued strong, and it has been possible to satisfy requirements only by obtaining maximum production from all mills. Then should be some relief as to these products, beginning with the third quarted due to the completion of new facilities, and especially if the requirements of the Maritime Commission should decline somewhat, as now seems possible. The structural shape situation is quite easy, and shapes are readily obtainable within the limits of overall allotments made by the Requirements committee of the WPB.

You are familiar with the situation as to alloy steels. Here, the demand has declined to the point where there

a Problem of Vital Concern Tay Engineering and Maintenance Officers

Speakers representing WPB and using departments discuss prospects, needs, and ways to reduce requirements at annual meeting of the A.R.E.A.

is no longer any necessity for substituting carbon steel for alloy steel in places where alloy steel will provide a superior service.

Crossties and Lumber

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The last two years have been difficult in regard to crossties. Production was slowed down in 1942 by the beginning of the labor shortage and by the uncertainty regarding price regulation created by the Office of Price Administration. Crossties were not exempt from the General Maximum Price regulations issued in March, 1942, and yet it was almost the end of that year before prices were fixed for ties. It was indeed unfortunate that the government price agency found it necessary to fix maximum prices for ties when there is only one consumer for ties, the transportation industry, particularly when they did not see fit to place some control over the two elements of cost which enter into the production of ties-labor and stumpage. Also, there was a delay of almost another year before the maximum prices for treating services were

Due to the slow down in production, while the demand for crossties has continued, it has been necessary for the railroads to accept grades and species of ties which are ordinarily not standard for their use. Let us hope that the day is near when we can get back to buying what we want and need to maintain our roadways properly. We are not "out of the woods" yet so far as tie production is concerned, and there is every evidence that 1944 will still be a tight year for treesties.

Recently, new regulatory orders were issued by the Lumber division of the War Production Board which affect the procurement of lumber for railroad use. So far, these orders merely cause a delay in purchasing and shipping, while paper applications and authorizations are being passed back and forth between the buyer and the War Production Board; and there are indications that some inventory and anticipated use reports will be required before orders can be approved and cleared. All of this is deemed necessary by the War Production Board because of the extremely tight demand for lumber for all essential purposes. So that you may see just what the present lumber situation is, I quote from a statement given to me by the Lumber divi-sion of the War Production Board.

"Preliminary estimates of 1944 lumber requirements total 35.5 billion board feet. Of this total, 1,287,000,000 board feet are for railroad construction and maintenance, 616,000,000 board feet of which are for car construction and repair. A total of 2,418,000,000 board feet have been estimated as the requirements for crossties and switch ties, of which about 60 per cent is expected to be in sawed ties.

"The production of lumber in 1944 is estimated currently at 31 billion board feet, in the light of present and prospective manpower and equipment problems. However, in view of attempts being made to ease the manpower and equipment situations, a production goal of 34 billion board feet has been set by the WPB. At this early date, the possibilities of industry's reaching that goal cannot be determined. As the actual lumber supply and requirements for 1944 develop, it may be necessary to tighten existing controls on lumber distribution and use by requiring the substitution of unusual grades, species, and sizes of lumber in railway construction, as well as for other uses."

Work Equipment

On behalf of the War Production Board, the following statement is made on the subject of equipment and tools.

"Many items of work equipment for maintenance of way and bridge work are more readily obtainable now than they were a few months ago, but several complete units of equipment are still difficult to obtain on reasonable deliveries because of the shortage of raw materials, component parts and inadequate manufacturing facilities. Many mechanical devices used in track work cannot be delivered promptly because component parts of aluminum and copper are not obtainable. There is an ample quantity of aluminum available but the means of processing castings and extruded shapes are not sufficient ot supply the demands, and in some cases the substitutions of essential parts composed of other metals cannot be accomplished satis-

"Due to the shortage of manpower in industrial plants, as well as on the railroads and in public utilities, a tremendous increase in applications for mechanical devices has been received. This is noted particularly in the case of 250-ton wrecking cranes, adzing machines, tie tampers, crawler tractors, bulldozers, scrapers, drag lines, power wrenches, spike pullers, bolt tighteners, and rail laying machines. Burro rail laying cranes and tie adzing machines are in greater demand than the production ability of the companies that build them. Burro cranes are not obtainable now by new applicants until 1945. Adzing machines can be obtained in about three or four months after the placing of the order.

"Drag lines are not at this moment available for delivery during 1944, as the entire production of these units is being taken by the Army. Crawler tractors are being requested in greater volume than ever before and, as only a limited number are available, prompt deliveries cannot be made except occasionally when a cancellation is received due to a change in program. It is estimated that the requests for mechanical track devices in 1944 have increased at least 200 per cent over those received a year ago.

"It is essential that applications to the War Production Board for equipment contain valid and detailed reasons why the equipment is needed, where it is to be used and the amount of similar equipment now in use by the applicant. The simple

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statement of "shortage of manpower" or "for use for general maintenance work," will not suffice. Those applications giving detailed reasons as to the essentiality of needs are given preference, and where it is necessary to deny such applications, reasons for that denial are given, and frequently the suggestion is made that the applicant re-apply at a later date."

It is the policy of the War Production Board, through its Transportation Equipment division and other Industry divisions, to be of all assistance possible to the transportation industry in providing those materials, devices, and equipment which the industry can show clearly are necessary to bring about greater safety in operation and more efficient and speedier transportation service.

The following statement by Donald Nelson, chairman of the War Production Board, made before the House Flood Control committee on February 22, sets forth clearly the position of the War Production Board on the question of essential and unessential projects.

"Projects which would involve large requirements of manpower, construction

equipment, lumber, trucks, tires, gasoline, and oil, would clearly interfere with the war program.

"On January 11, 1944, just a little more than a month ago, the full Beard of the WPB discussed in detail the question of relaxing present restrictions on new construction and facilities. You are familiar, no doubt, with the decision reached—in my judgment the only possible decision—that present restrictions on all new construction and facilities must be continued until the probable future course of the war becomes clearer. A test of every proposed project must, therefore, continue to be—the extent to which it will contribute directly to the prosecution of the war or to the maintenance of a sound civilian economy needed to win the war."

While I have not attempted to cover all items of material used by the engineering departments of the railways, it is fair that you should assume that the restrictions which I have mentioned with respect to a few major items apply equally to all critical materials and to all projects involving such materials. Let us bear in mind that "essentiality in the war effort" is the yardstick with which all of your applications are measured.

ture was cut apart, shipped to a new site and rebuilt into a deck structure of shorter length. No new material was purchased, sufficient material being secured for bracing and details from the old floor beams and stringers. These instances indicate what can be done with old structures to adapt them to new conditions and modern loading. To an equal extent, the use of reinforcing steel can be eliminated or reduced materially in constructing concrete retaining walls and arches if the designs are based on gravity sections.

Strengthening Bridges

On any line, a bridge, by its design, may restrict the weight of motive power permitted. Such restrictions may be removed by strengthening, at moderate cost, thus postponing the more expensive job of complete renewal. This strengthening, however, should be done only after the design of the structure and its condition have been analyzed carefully to determine whether such reinforcing will be effective, particularly in the details of connections.

The problem of maintenance is one that should be uppermost in the mind of the bridge engineer, both when designing new structures and when engineer to prolong the life of existing structures. Maintenance embraces preventive work. To be most effective, such preventive work calls for frequent inspection and a system of records that will enable the engineer to know at all times the true condition without any guess work. Positive knowledge is needed as a basis for effective maintenance.

Stone masonry will go to pieces if not kept pointed. Disintegrated concrete should be repaired, steel structures should be kept painted. If acted upon promptly, this will prolong the life of a structure and reduce the amount of critical material required for either a complete renewal or a major repair.

al or a major repair. The effect of corrosion and the increase in the weight of equipment are two of the engineer's greatest nightmares. When he is confronted with a structure in which only part of its useful life has expired, he must, by some method, repair or strengthen it so that it can continue in service. Welding will not solve all of our problems, but many do arise where no other method is so well adapted. It is a great aid in repairing defective details. In the reinforcement of old structures it has an advantage over riveting because it provides a means for attaching new metal without the use of rivets or bolts.

To my engineer associates—our

Many Ways to Overcome Shortages in Bridge Materials

By A. R. Wilson

Engineer Bridges and Buildings, Pennsylvania Philadelphia, Pa.



IN the present emergency our government has set up various agencies to control the use of materials so that from whatever is available, each will receive his equitable share. The kinds of ma-

terials available for bridge work are limited and most of them are now critical; therefore, bridge engineers must exercise their ingenuity in the use of these materials.

During this war, very few new railroad structures have been built because of the restricted use of new steel—reinforcing rods, structural plates and shapes. In the preparation of the designs for those structures that have been built, particularly careful consideration has been given to erection, to minimize interruption to traffic. I am familiar with one refonstruction project in which a truss

bridge was replaced by plate girders, where the old stringers were used and where the design was so developed that the complete removal of the trusses and the erection of the girders were accomplished without interruption to any scheduled train. The erection material was then salvaged for use in a permanent structure.

Recent issues of the Railway Age have contained articles on the revision of alinement on the St. Louis division of the Pennsylvania, in which the bridges employed were refabricated from girders removed from a viaduci in Newark, N. J., the girders having ample strength with their shortened lengths.

About a year ago, the army engineers built a canal about six miles long across the southern tip of New Jersey, connecting the Atlantic ocean with Delaware bay—requiring that several drawbridges be built, one a railroad bridge. This construction was carried out during the time that new steel was most critical. However, the canal had to be built and the railroad had to continue in operation. In studying this problem, a half-through plate girder drawbridge, not in service, of longer length than was required, was located. This old struc-

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job is to keep our bridges safe. I consider that one of the measures essential to meet the shortage of materials is to assume an attitude of openmindedness. It is a human characteristic to think well of practices for which we are responsible or which we have followed for a long time, but to get the best results we must consider new suggestions fairly and endeavor to adapt them to our practice or to modify our method so as to embody any improvement which may be practicable.

This association has a wealth of information and recommended practices tucked away in its publications, which, if studied, will indicate the best way of doing a job economically. Upon the recommendation of the Committee on Iron and Steel Structures, the A.A.R. has participated in the cost

of an investigation of the fatigue failure in its relationship to the strengthening and repair of steel bridge members. This report appears in one of the recent bulletins and indicates certain facts which should be borne in mind in the strengthening and repairing of bridge members.

In the same bulletin there is a progress report on An Investigation of Electrolytis Corrosion of Steel in Concrete. I wonder how many structural engineers ever thought that this subject was of concern to them. These two articles are typical of many to be found in the publications of this association. I am convinced that if the engineer will review these publications, many suggestions will be found as to the most effective measures to be taken to meet the existing shortage of materials.

Concrete, brick, tile, marble, plaster, composition roofing, glass, sewer pipe and paint are not restricted. Reinforcing and structural steel shapes and sheet steel lighter than 18 gage are available. Small quantities of pipe, wiring and hardware are also to be had. Thus, there is ample material to keep our available building mechanics busy continuously with essential maintenance work. With the use of such materials and other non-critical materials, it is possible to construct simple brick and concrete buildings from foundations to finished plaster. Furthermore, with the closing of some war plants, more skilled building mechanics, especially among older men, are available today for employment than were available a year ago.

Some Construction Permitted

Some new building construction, especially the replacement of facilities destroyed by fire, is absolutely necessary to the movement of troops and war materials. Government regulations and conservation orders provide for such construction.

The March 7th revision of the War Production Board's Order L 41 states that permission is not necessary for the "laying of railroad tracks, together with the construction of necessary operating facilities, but not including buildings, tunnels, over-passes or bridges." The Association of American Railroads receives interpretations as to what will be allowed as operating facilities. It is necessary to make formal requests of the War Production Board for permission to construct most types of buildings costing more than \$1,000, to be spent in any one year, except that second-hand material and the labor to install this material may be used on any such projects in addition to the \$1,000 worth of new material.

Lumber the Bottle-Neck

The shortage of lumber constitutes the bottle-neck in our present building problems, with no indication of relief in sight. On-hand stocks of lumber are reported to have diminished from 17 billion to 6 billion ft. b.m. in the last two years. At that rate, present stocks will be depleted in about a year. The mills are handicapped by the fact that many of their skilled and most productive men have been replaced by others who have not been trained in the operation and maintenance of their deteriorating equipment. It is said that present war needs require 70 per cent of the nation's normal annual production, and there is no indication that these war needs will diminish soon.

Much That Building Men Can Do

By A. L. Sparks
Architect, M-K-T,
St. Louis, Mo.



WHY should we worry continually about the shortage of certain building materials when there is more than enough of other kinds of building materials to keep us busy, and such

eminent need for catching up on some of the things that we have necessarily postponed during the last decade for lack of funds. Regardless of the accepted rules for figuring depreciation, many of our present buildings which, according to figures, should have fallen down 20 to 50 years ago, are still good operating facilities and, with proper maintenance, will continue to be for decades to come.

Most of the older members of this association have been over the same road we are traveling today, and know full well that the prosperity we are now enjoying will all too soon go over the hump, and that we will then start on the down grade. It would seem well, therefore, to consider first most carefully putting our present facilities into the best possible condition, knowing that, regardless of our ambitious building plans, we will probably be forced to go through another decade with many of our present old buildings.

Government permission is not required for maintenance and repairs, provided that we have the materials with which to complete them, or can secure the materials within our regularly authorized allotment. There is a vast amount of maintenance work which can be done with non-critical materials. What are some of these classes of work?

We can help relieve our future load by catching up on repairs to concrete floors and pavements, masonry foundations, retaining walls and substructures. We can correct defects in drainage and sewer systems, heretofore crowded out by other construction projects. We can clean and rake the defective mortar joints in terra cotta, stone, brick and masonry buildings; tuck point them and install new wall caps and copings; and calk around the windows and doors—all with non-critical materials. We can repair and waterproof the weathering surfaces of expensive concrete structures to prolong the life of these structures.

Most of our buildings, doubtless, are now painted, but there still exists forgotten rusted and corroding steel which can be cleaned with inexperienced labor and coated with rust-resisting and inhibiting materials. Furthermore, we can renew worn out and leaky roofs with new long-life roofs, using non-critical materials, and thereby placing these unavoidable expensive repairs behind us for many years to come, while at the same time protecting the valuable wood sheathing and framing.

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War Production Board Instruction No. 617 states that "The salvage of all reusable lumber; not specifically incorporated in a structure, is mandatory and its destruction is prohibited. Such lumber shall be made available immediately for reuse."

Obviously, the small amount of building lumber that we will be fortunate enough to secure in the near future will be precious, and should be used sparingly for making sash and doors and for only other most vital needs. Under these conditions, the most important matter confronting building men is the conservation of their second-hand lumber piles. In fact, it may be that, before the present emergency ends, we will be tearing down some frame buildings and rebuilding them with brick and concrete in order to get form lumber with which to construct essential facilities. Never before were so much skill and study justified in the design of concrete forms as now. All form lumber should be so cut and framed that forms can be erected, taken down and re-erected the maximum number of times with a minimum amount of waste and breakage.

If the war were to end tomorrow, we would still be faced with a lumber shortage for many months. There would be some reclaimed material from abandoned and dismantled camps and war plants, but local dealers, no doubt, will quickly absorb all this to restock their empty yards.

A few months ago a careful search was made over all of our properties for every piece of non-essential brass and other metal. Perhaps we could now well afford to make a very careful survey of every building and other structure with the view of locating and cataloging for possible future use every available surplus or unnecessary scantling and plank. No doubt, we would find second and third-story partitions and framing no longer used, which could be thinned out, or abandoned file shelving that could be put to good use. Such inventories might reveal surprising possibilities. Some old buildings might even yield white pine joists and other timbers which could be used for the construction of doors and windows not otherwise obtainable.

Careful consideration should be given to every detail which might create a possible fire risk, regardless of insurance. Defective chimneys should be repaired or relined, and every effort should be made to keep present buildings in condition to make them last as long as possible. House insulation is readily available at small cost, and, used in many of our older buildings, can be made to serve as a good fire retardent, as

well as to help conserve the nation's coal supply.

The most effective measure that we can take in the light of the present building material situation is to quit

worrying about the things we can get, and to use the things that we can get to place expensive repairs behind us—leaving new lumber for Under Sam in winning the war.

Water Service Men Are Finding Ways Around Problems

By A. B. Pierce
Engineer of Water Service,
Southern
Washington, D. C.



DURING the present war emergency, the railroads have employed many ingenious methods to cope with the problems presented by the necessity of fulfilling their everincreasing water

requirements with greatly reduced supplies of materials. In this connection, it is pertinent to mention that the extensive use by the railroads of automatic electric pumping equipment has saved coal, fuel oil and other critical materials for the war effort and has released coal and oil tank cars for other uses. Furthermore, as this type of equipment does not require manual attendance, it has helped to cope with the manpower shortage.

At many locations our water requirements had more than doubled and, to prevent serious train delays, changes had to be made at once without requesting priority assistance. Toward this end a complete survey was made to locate abandoned pipe lines that could be reused. Several miles of different size pipe and fittings were recovered, cleaned and thrown into service for discharge and suction lines. At Princeton, Ind., we cleaned 5,500 ft. of 4-in., 6-in. and 8-in. cast-iron pipe and thereby avoided the necessity of buying new materials.

Abandoned steam pumps and boilers were thrown into service at new locations and were used as emergency equipment to augment our main water stations, which, due to lack of capacity or insufficient water at the source of supply, were unable to meet the additional water requirements. In many cases these old auxiliary steam plants have prevented the main stations from running out of water. If the operating cost is not considered, the old steam pumps are capable of render-

ing reliable, and flexible service under emergency conditions. Additional elevated storage tanks had to be installed to meet the augmented peldemand for water. These consists of second-hand tubs installed a frames built from lumber salvage from filled trestles. To permit the use of trestle lumber in the construction of tank frames, it was necessary for us to change our standard design for such frames.

Adopt Many Substitutes

At several water stations it was necessary to construct dams in the creeks to store all of the water available. At other locations, existing dams were raised and storage resoroirs enlarged, all of which was accomplished without the use of critical materials. Where pipe for new pix lines had to be purchased, we have used cement-asbestos pipe to prevent the use of critical material. However, it was not long before this type of pipe was more difficult to obtain than iron pipe. At one emergency water station, we were forced to use both cast iron and cement pipe in the same long discharge line.

Because of the difficulty of obtaining rubber repair parts for water of umns, pumps, etc., the matter wataken up with the manufacturers wataken up with the manufacturers determine what could be done. As result, arrangements were made it use parts made from synthetics and from reclaimed rubber. Also, a leather manufacturer advised that he could make substitutes for the rubber parts we were unable to obtain. Moreover, it was found that much more promoted delivery of repair parts could be obtained by accepting iron pistons, of inders, etc., in place of standard bras or bronze parts.

Due to the shortage of pump repairmen and the additional work required of those remaining in service to maintain our over-worked pumping equipment, we have supplied them men with automobile trucks. These trucks make it possible for the repairmen to maintain a greater number of stations by permitting them to take

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along the necessary heavy repair parts, tools and helpers. Their use also makes it possible for the repairmen to reach the stations by highways in the least time possible, without working their way through terminals and shop areas on a motor car. As a further means of saving time and labor, the pump repairmen have been furnished with motor-driven tools, such as saws, grinders, pipe-threading machines, drills and trench pumps.

Some New Facilities Essential

We were not always so fortunate as to be able to take care of our increased water requirements by the use of second-hand materials. Complete new stations have been installed involving deep wells, motors, pumps, new tanks and pipe lines. At one location where the city advised that it could no longer meet our demands, we have drilled three deep wells. At this location our original source of water, and the only one available, had become polluted, prohibiting its use. Incidentally, to meet the requirements of the WPB, the motors for the new pumping stations had to be figured on the basis of 20 per cent overload.

We are now drilling wells at several different locations in an endeavor to satisfy our increased water requirements and to avoid causing delays to troop, passenger and freight trains that may be occasioned by the present method of obtaining water from small creeks. New and larger pump discharge lines have had to be installed, together with larger water columns and water-column supply lines, to speed-up train operation. Until relatively recently, a discharge capacity of 3,000 gal. per min. for water columns was considered ample, but with the increased traffic and larger tender tanks now in use, 5,000 gal. per min. is desired.

Owing to the great increase in passenger service, involving troop movements entailing both Pullman and coach trains, many new drinking water facilities had to be installed. Existing water facilities have been enlarged to reduce the time required to water long trains. All of the coach water systems had to be installed in strict accordance with the specifications of the United States Public Health Service. Additional water installations were also required for Diesel-electric locomotives, which are now used in both freight and passenger service. About three times as many watering points are required for air conditioning systems and Diesel engines as are needed for supplying fuel oil.

Relative to the use of chemicals for water treatment, the WPB, by means

of limitation orders, was obliged to restrict the use of soda ash, alum and tannins. We were advised that the railroads would be limited to about 70 to 80 per cent of the amount of soda ash used in 1941. As soda ash is one of the most important chemicals required in water treatment, and as our water requirements were constantly increasing, the matter was taken up with the WPB with good results.

In July, 1942, the WPB issued a restraining order to the effect that alum or aluminum sulphate could be manufactured only from an inferior grade of bauxite. Accordingly, emergency alternate specifications for aluminum sulphate were adopted by the American Water Works Association, reducing the alumina content from 17 per cent to 14 per cent. Because of this change it was necessary to make adjustments in our treating plant procedure. By appealing to the WPB each month, some of the chemical companies have been allowed to use a portion of their high-grade bauxite for the production of 17 per cent sulphate of alumina, and so far we have not been affected seriously.

In February, 1943, the WPB is-

sued a limitation order curtailing the use of chestnut tannins for water treatment, following which the A.A.R. called on the Emergency Committee on Water Treatment to investigate and report on the results of the order. The ensuing report requested that the conservation order be modified to permit the railroads to use chestnut extract for boiler water treatment as a necessary requisite for safe and dependable operation, but that some percentage reduction in the amount of chestnut extract used could be made in the various formulas, possibly as much as 25 per cent. Any curtailment in the use of tannins beyond a certain amount will result in scale formation in cold water lines, injectors, boiler checks, feed-water pumps and heaters, and in locomotive boilers.

Many satisfactory synthetics and substitutes have been introduced to take the place of critical materials, but so far no one has come forward with a substitute for water. We may use wood, coal, oil or electricity for producing steam but we still must have water. In spite of our Diesel power, we must still take care of the increasing thirst of our steam locomotives.

Patriotism Demands Stretching the Life of All Track Materials

By A. A. Miller

Ch. Engr. M. of W. and Structures, Missouri Pacific St. Louis, Mo.



IN meeting the vital transportation requirements brought about by the war, we find ourselves faced with unusual, uncommon, and extraordinary conditions. Serious problems chal-

lenge us; they must not only be met, but must be overcome. Individually and collectively we must think and act in harmony and unity of purpose, always seeing things in their proper perspective.

We have a patriotic and sacrificing obligation to our country, our armed forces and ourselves to extend the life of materials now in use before replacing them, if that is safely possible; to do more to reclaim materials where that is safely possible; to exercise the greatest care in programming

work and in making material applications; and, most certainly, not to purchase new materials beyond the requirements of what I will call "patriotic, unselfish sufficiency and safety," and then only after we have made a fearless analysis of the conditions that obtain or are liable to obtain.

Some of the things demanded by patriotism in the use of materials are not economically sound; but we are not dealing with economics, we are trying to win a war—to save lives. We will accomplish this most quickly and at least cost if we will forget economics for the moment and will remember only the realities for which we fight and to which we have dedicated our efforts.

The present and prospective shortages of track materials call for highly efficient supervision to insure the most effective use of those materials that are available. More careful and detailed inspection is required than ever before to make certain that renewals are not made at one point where not required immediately for safety and sufficiency, at the expense of some other location where the need, as

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measured in terms of safety and sufficiency, may be greater. Such inspections require mature judgment and a somewhat different attitude on the part of those responsible than that necessary to be justified in normal times. Previously planned and approved programs may have to be suspended temporarily or revised to meet the unforeseeable conditions which arise from abnormal traffic.

Get the Most From Rail

In rail, the most common cause for removal from primary main tracks is the condition of its ends. In ordinary times a point is reached when it is no longer economical to overcome rail batter by building up the ends, or to improve joints by the renewal of bars. This is true particularly where the rail is of lighter section than standard for the particular line, and where this rail, if not carried too long in heavy-traffic territory, will give good service on secondary or branch lines. Frequently, rail of lighter section is removed from heavy-traffic main lines even sooner than condi-tions imposed by the traffic require, because of the need for the rail in lighter traffic lines. This is done too because, so long as new rail is to be purchased, it should be of the heaviest section used by the railroad, and hence should be applied in the heavy-traffic Today, however, under territory. present shortages of materials and labor, it is nesessary to carry rail much longer in its original location. This is being done by restoring its battered ends by welding, and by repairing worn joints by the use of shims, reformed bars, etc. Furthermore, rail renewals can be limited to short stretches of track, such as on curves, where wear of the existing rail is approaching the safe limit.

This longer retention of the rail in its first location not only reduces the amount of new rail that must be purchased and laid, but also, and of considerable importance, reduces destruction of the ties. The laying of new rail is always unavoidably hard on the ties, even when carried out by the most highly approved practices calculated to minimize tie damage.

The practice of reclaiming rail by removing it from the track and cutting off its worn ends is of doubtful propriety where labor shortages exist. It is probably better, where possible, to restore the rail ends and joints without removing the rail from the track, if for no other reason than the amount of labor that can be saved.

Oiling the entire rail to retard corrosion resulting from brine drippings is good practice in normal times and should be continued in war times,

where possible, on those lines carrying considerable refrigerator traffic.

There is nothing new about scrap reclamation on the railroads, but in normal times there is an economic limit to the amount of labor and expense which should be spent in this endeavor. For example, normally it would be false economy to spend three cents to straighten and recover a two-cent spike. Under present conditions, however, such recovery may be entirely justified.

In normal times, when track is being given a general reconditioning such as accompanies rail or ballast renewal, it is economical to take out all crossties that are approaching the end of their effective life, even though some of those ties have a year or two of life remaining. This is done to avoid the necessity of disturbing the track for several years after its rehabilitation. This practice is particularly justified on lines of heavy traffic where labor costs are always high. Under present conditions, however, with only a fraction of next year's normal tie requirements in sight, it is undesirable to renew any ties which have not fully completed their service life. Tie renewals today require unusually close supervision to avoid going too far one way or the other, particularly where foremen have been trained in the normal-times point of view, and may not appreciate fully just what is involved in this matter of conserving materials.

It is more important than ever before to give proper care to any ties in track which have been damaged by dragging equipment or other cause. Splintered edges should be trimmed off and swabbed with creosote. The judicious application of creosote to damaged ties in track, can accomplish a great deal in retarding decay.

In some cases, in view of the shortage, and particularly on light-traffic lines, it may be necessary to turn some ties over in order to secure a face that will support the tie plates and hold spikes properly. Such processes, again, require that mature judgment be used.

The abandonment of branch lines may provide usable ties. Therefore, the process of taking up the track should be so devised as to avoid damage to any usable ties. It may be desirable to re-treat some such second-hand ties, particularly where the treating facilities are not too far distant. In any event, the application of creosote to the rail bearing areas, or to other exposed surfaces of the ties, at the time the track is being taken up, is very desirable to check any incipient decay. The benefits of such detailed care are out of all proportion to the cost involved.

These few examples are cited to spring our thoughts into action, and to disrobe ourselves, where this can be done safely, of the limitations of past practices which would eternally remain present practices if men's minds, under stress of emergencies, needs and requirements, remained apathetic and dormant.

Let me bring to mind some other things. Some railroads do things in the way of reclaiming materials that others do not do. What may be good and economic practices in normal times for some, may not be for others.

Is it sound economy to upset and reshape "neck cut" spikes? The answer is no, but it can be done and is being done on some roads. A very simple die, which can be made in almost any shop at a cost not exceeding \$40, can be used to upset and reshape spikes to "design form." These reshaped spikes, which are about ½ in shorter than standard, are suited perfectly for use on light-traffic lines, or for hold-down spikes—tie plate to tie.

Can rail anchors be reclaimed? Yes, any type. Is it being done? Yes, some railroads operating reclamation plants are doing it. With some types of anchors, it is not economical to reclaim them; with other types, the results are good to an extent not exceeding 60 per cent. But, as I have said before, we are not dealing in economies now, we are contributing to the war effort in any way that we can

Can crossties, no longer fit for use as ties in any track, be used for any other purpose? Yes, they can be used for fence posts and for stabilizing the roadbed. It can be done. Some railroads are doing it.

Are we still using track tools on the basis of wear limitations set up years ago? We can safely change those wear limits. Some railroads have done it. All railroads can do it.

Do we still use full ballast sections because we always have, and they are standard? In a time like this, the "semi-box" section can be used safely, with the ends of the ties completely exposed on tangent track and on the low sides of curves, where the track is fully anchored and equipped with double-shoulder the plates.

Do we continue to overhaul and rebuild motor cars on the "50 per cent, or to 70 per cent of the cost of a new car" basis, or do we overhaul them when they are sent in and examine the cost sheets afterward? At a time like this, the latter way is the patriotic way.

Are War Effort committees being set up on individual railroads, whose duty it is to draw conclusions with respect to what can or can not be hn

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done safely to meet the requirements of sufficiency on their respective properties, and thereby reduce to a minimum the purchase of new materials? This should be done, and the results of these committee efforts should be cleared through the American Railway Engineering Association to the end that all railroads may benefit from the things that are being accomplished.

Let us not only think and talk of these things; let us try them out, and if our results are sufficiently satisfactory, let us not keep our "light under a bushel."

Cut the red tape, and clear your thoughts and suggestions through your committees, or go directly to the secretary of this association, who, in turn, will send them on their way through proper channels to help the

We are at war. Our armed forces are neither retreating nor looking back at us; they expect us to be back of them, backing them up. I hope I have given a few suggestions as to how

we can do this.

To sum up, the problem presented calls for the very best supervision and an attitude that will permit deviation from the standard practices of normal times, even though the ultimate economy may be affected adversely. The question is, "will it work, rather than does it pay?"

Manpower— The Critical Factor

(Continued from page 347)

English to provide interpreters for each gang. Your foremen will, undoubtedly, endeavor to secure a working knowledge of the Mexican language applicable to track work, but it has been my experience that the Mexicans will learn the limited amount of English necessary, long before the American foreman will learn a corresponding amount of Mexican.

Allocation of Mexican Nationals is, of course, made by the War Manpower Commission. After this allocation, and the destination of the men at Mexico City, the men are transported to the border. To date, this has generally been done in Mexican railroad equipment. During these stages of handling the men, the Santa Fe has kept a man in Mexico City to facilitate matters in every possible way. The Mexicans that we receive come into the country at El Paso, Tex., and are transported in our own equipment to the points where they are to be used. We pay the fare of the employee in Mexico, and for his food; we also arrange for his food on the trip over our own lines.

Extra gangs are housed in bunk cars of the usual converted box car type. These cars are gone over carefully to be sure they are weather-tight and, immediately before the arrival of the Mexicans, they are fumigated. Eight to twelve bunks are placed in each car, depending upon its size. Double bunks are in general use, and, so far as possible, these are of steel, taken from a stock on hand before the present emergency. Otherwise, they are of wood. Straw mattresses are furnished the men by the company. Each bunk car is furnished with kerosene lamps, a coal-burning heating stove, and a wash bench, with bucket and wash basin. Portable toilets are furnished for each bunk

The boarding outfit usually consists of a kitchen car, with two large ranges, an ice box, etc., with a dining car coupled to each end. The usual boarding outfit has a seating capacity of about 120 men. There is also a commissary car carrying the usual run of supplies, with some work clothes. In general, the Mexicans require small sizes of shoes that are sometimes difficult to secure.

Each camp is furnished with a shower car. This car has six to eight shower stalls at one end, and is equipped with overhead tanks for both hot and cold water. The opposite end of the car is equipped with dressing benches and two tubs for washing clothes. The water is heated by means of a kerosene water heater. The general water supply at the camps is contained in a water car, from which the water is pumped to the tanks of the shower car by means of a small gasoline-driven centrifugal pump on a hand force pump.

We employ Mexican Nationals on our sections as well as in our extra gangs. On our sections, they are housed in our section bunk houses and purchase their food supplies from local dealers. We also employ some Mexican Nationals as shop laborers, who are housed and fed under conditions similar to those on our sections. To date, we have not used any Mexican Nationals in our bridge and

building department.

The usual sanitary regulations are complied with at all camps, and these are checked periodically by Mexican consular representatives.

Special Foods

Board for extra gangs is furnished by a contractor at rates established for our regular extra-gang laborers. The contractor is familiar with the Mexican diet, and furnishes food conforming as nearly as possible to the wishes of the men. In general, Mexican food is more highly seasoned than American food, and consists of special items which may be strange to maintenance men in sections of the country other than the Southwest. Cooks should be provided who appreciate the wants of the men.

The Mexicans' wages are paid in cash, and in full, except for Railroad Retirement deductions and for 10 per cent held by the Mexican government for the worker. When paid, the Mexican workman wants time to exchange his money for Pesos and to forward them to Mexico. On pay day, the Mexican Nationals congregate with our native Mexicans, and, as with any other group of men, some drink to excess. Our native Mexicans handle this situation without any trouble. but in other parts of the country it may be necessary to watch this situation carefully.

As to safety, the Mexican Nationals that we have employed to date have turned in as good a safety record as

have our other men.

A joint Mexican-American commission has been meeting in Washington, D.C., in an endeavor to work out clear-cut definitions under which Mexican Nationals can work on American railroads. I regret that up to this time no definite conclusions have been reached.

It now appears that the following restrictions will be placed on their em-

ployment:

The place of employment will be designated as a roadmaster's district, and if we have on any district a contractor doing track work, either maintenance or construction, and the contractor's laborers receive a higher rate of pay than regular railroad laborers, we must not permit Mexican Nationals to work on that district, because it is their understanding that they will be paid the same wage as domestic workers for similar work. There will probably be an exemption to this in cases of washouts, slides, wrecks, fires and actsof-God.

Grading under contract with heavy machinery will probably be exempted, but incidental hand work, not necessary to the operation of the heavy machinery, will not be exempted. This would mean that we could not permit the grading contractor to dress the slopes of embankments, cuts and borrow pits by hand, and that cleaning and grubbing could not be done by hand, but might be done with power machinery

In summary, the Mexican National is a good workman, but special provisions must be made for his use.

A Broken Rail Ditches Train on A.C.L.

ON October 17, 1943, a northbound passenger train on the Atlantic Coast Line was derailed at Bellbluff, Va., killing one passenger and injuring seven passengers and one employee. According to the report of the Interstate Commerce Commission, from which this is abstracted, the northbound track, upon which the accident occurred, was laid with 33-ft., 100-lb. rail which was installed in June, 1924. It was fully tie plated, single spiked, and anchored with four anti-creepers to the rail. The rail was supported on 20 ties to the rail length and the track was ballasted with 6 in, crushed stone. Train movements were governed by automatic signals and the authorized maximum speed for the train involved was 75 miles an hour. The line was tangent for 3.62 miles south of the point of derailment and for 3,313 ft, beyond it, while the gradient was 0.454 per cent, descending for north-bound trains. In 30 days preceding the accident an average of 30.86 trains passed over this track daily.

First 76, the train involved in the derailment, consisted of a locomotive, one baggage car, seven coaches, one dining car, one tourist sleeping car, two standard sleeping cars and an army hospital car, in the order named, all of steel construction. It passed Dunlop, 9.8 miles south of Bellbluff, the last open telegraph office, at 10:35 p.m., 20 minutes late, and was running at an estimated speed of 65 to 70 miles an hour when derailed.

The locomotive and the first eight cars remained coupled and stopped with the locomotive 2,933 ft, beyond the point of derailment, with only the rear truck of the eighth car derailed. The remaining cars were all derailed to the west, with the rear end of the thirteenth car 166 ft. north of the point of derailment, and all were badly damaged. One of the west rails of the northbound track passed through the bolster and floor and entered the right side of the front end of the hospital car, at an angle of 45 deg., causing the fatality.

After the accident, a rail on the west side of the track was found to be broken into many pieces, of which 13 were recovered within a distance of 540 ft., to the north. It was determined that the first break occurred between two ties, 14 ft. 8 in. north of the receiving end of the rail, the e ends of the adjoining pieces being bat-

tered down at an angle of about 30 deg. The adjacent ends at the third break, 5 ft. 11 in. further north, were also battered and a flange mark was found on the receiving end at this break. Apparently, breaks 2, 4, 5, 6 and 7 were the result of the derail-

At the first break there was a progressive detailed fracture covering about 12 percent of the cross section, extending to the outside edge of the head 1/2 in. below the top of the rail. This portion of the fractures was darkened by oxidation, indicating that the defect had existed for some time prior to the accident. However the ends of the pieces at this break had been polished by friction, so that the exact extent of the fracture could not be determined, but most of the head, the web and base indicated a new break.

This fracture occurred beneath a wheel burn which extended inward 1-5% in, from the outside edge and was approximately 1/8 in. deep. Breaks 1, 2, 3, 5, and 6, all occurred at wheel burns. There were also two other wheel burns on the piece which was 14 ft. 8in. long. A rail-bending test was conducted to determine the strength of this piece at the two burns. The first was made at a point 5 ft. 2 in. north of the receiving end, and the rail broke easily. A fracture which had not yet extended to the surface, was found at this break.

The second test was made 12 ft. 3-1/2 in, north of the receiving end. and the rail cracked under a deflection of 1/2 in., breaking when the deflection was increased to 5/8 in. At this burn, a crack 11/2 in. long started at a point 1/4 in. below the top of the rail, extending downward at an angle of 15 deg., and stopped 1/4 in. south of the point of fracture. At the point of fracture there was a burn extending inward from the outside edge 11/4 in. and to a depth of 3/8 in. Below this burn, a horizontal crack started at the outside surface of the head and extended inward for 1-1/2 in. Immediately below the horizontal crack, there was a progressive fracture, half-moon in shape, 34 in. wide and 3/8 in. deep. The outer edge of this fracture was about 1/4 in. from the outside edge of the head.

Extra 1,623 was the last train to pass over this track prior to First 76. This train, consisting of a locomotive.

69 cars and a caboose, was stopped at signal 80, the automatic signal which governed northbound train movements in the block when the accident occurred, and which was located 1,160 ft. south of the point of derailment, by a stop-and-proceed indication. It then moved through the block at a speed of five to eight miles an hour, about 40 minutes before First 76 was derailed. The crew did not observe any abnormal condition of the track and, since there was no apparent cause for the restrictive indication, the engineer reported the matter to the operator at the first open office. The operator notified the maintainer promptly, but the derailment occurred before he was able to make inspection.

First 76 received a clear indication at Signal 80 and, since the battering of the rail at break No. 1 was considerably greater than at break No. 3. it is believed that break No. 1 occurred before Extra 1,623 arrived at Signal 80, and that break No. 3 occurred during the passage of this train. The general roadmaster on this territory thought that the section of rail between breaks 1 and 3 was canted outward slightly and that the ragged ends at the breaks were in contact with each other sufficiently to maintain the signal circuit and cause Signal 80 to indicate Proceed to train First 76.

The track involved in the derailment was inspected by the section foreman from his motor car on the day preceding the accident. He performed work in the immediate vicinity of the rail which broke and made visual observation, but did not consider it to be defective. The roadmaster stated that when a detector car was operated over this section on October 7, 1943, he walked the track and examined the wheel burns on the rail which caused the accident, but failed to find any condition that would render it unsafe for further use. It has been the practice on this road that when wheel burns are found on a rail, the section foreman and the roadmaster decide whether the rail shall be replaced, unless the detector car indicates that the rail is defective. This road has run a detector car over its more important tracks at intervals of about one year.

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During the period from September, 1942, to August, 1943, a total of 1,278 defective rails were removed from tracks on the system, of which 135 were removed because of wheel burns. On the section upon which the derailment occurred, during the 12-month period preceding the day of accident, five defective rails were removed, of which two were afflicated with wheel



Advantages of Sub-ballast

What are the advantages of sub-ballast? The disadvantages? What materials are most satisfactory? To what depth should it be placed? Does the character of the subgrade make any difference? Of the top ballast? Why?

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By G. L. SITTON

Chief Engineer, Maintenance of Way and Structures, Southern, Charlotte, N. C.

I consider sub-ballast to be an important construction material. If it were possible to provide a perfect subgrade, that is, one in which no settlement would take place under traffic, there would be no reason for the use of sub-ballast. By whatever extent the subgrade falls short of perfection, by just that amount sub-ballast becomes necessary. A perfect subgrade would of necessity have to be constructed of perfect materials and with perfect workmanship. There will always be lack of perfection in each of these items.

Modern grading specifications, such as those used in the relocation of the Santa Fe around the John Martin Reservoir, are designed to produce subgrades of much better quality than those provided in former years. On our own road, our most recent grading specifications have been similar to those referred to, except that we have not had the equipment to use the so-called Proctor method for determining the maximum dry density of materials to be used for the construction of embankments. Furthermore, we have not yet started the practice of wetting embankment materials systematically, so as to secure maximum compaction. For these reasons, we have never constructed a perfect subgrade, or one even reasonably close to perfection.

On the other hand, we have constructed a number of subgrades with our forces by using side-dump cars, dumping the material from the elevation of the track and allowing it to roll all of the way to the bottom of the embankment, without any attempt to place it in horizontal layers or to roll it for the purpose of compacting it.

These subgrades have been so short of perfection that, without the use of sub-ballast, we would have had great difficulty in maintaining main-line tracks on the new roadbed. It has been our practice, therefore, to use granite screenings with a high percentage of dust as sub-ballast. We have maintained our tracks on this sub-ballast for as long as two years before beginning the use of our standard 1½-in. ballast.

I have in mind a case where we constructed approximately one mile of double-track main line on tangent to replace four curves. The new line crosses the old line twice, with fills as high as 50 ft. between the points of crossing. We, therefore, had a great deal of settlement at some points and none at others.

We started out by applying about 6 in. of granite screenings. The track was kept smooth by spot tamping and surfacing until the roadbed became stable. In some cases we had as much as three feet of sub-ballast under the track as a result of settlement before we started to apply top ballast. In applying this relatively porous sub-ballast it is, of course,

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in June

1. Are there any advantages in a crawler-mounted crane for laying rail? Any disadvantages?

2. How often should a locomotive coaling station be inspected? By whom? How should the inspection be made? What items should be given particular attention?

3. In view of the increasing shortage of labor, is it feasible to employ women in maintenance? To what extent? For what tasks? How should they be worked? Who should supervise them?

4. Considering the prospective easing of the steel supply and the continued critical shortages in structural lumber, what modifications, if any, in normal bridge programs should be made in 1944? Why?

5. Should ballast be cleaned before or after new rail is laid? Why?

6. What methods should be followed in handling, storing and use of chemicals employed in water treatment to prevent waste? Who should be responsible?

7. In view of the increasing shortage of ties, under what conditions is it advisable to re-use second hand ties? For what service? How should they be installed? Why?

8. Where a shortage of carpenters and mechanics exists, how can their work be carried on? In what ways can the skilled forces be built up?

necessary that it be spread to the full width of the roadbed to prevent the formation of water pockets, which would happen if porous material were used under the tracks only, with impervious material on the shoulders.

Does the character of the top ballast make any difference? We use only two kinds of top ballast on my territory—crushed granite and crushed slag. Both are satisfactory

on the sub-ballast which has been described. I do not believe that it makes any difference, so far as the sub-ballast is concerned, what type

of top ballast is used.

Heretofore, I have discussed subballast as a construction material only. When a railway has been in operation for a period of years it is too late to consider the application of sub-ballast. In such cases, however, the old ballast becomes subballast automatically as the track is raised on new ballast. In old track it is also necessary to avoid the use of impervious material which will confine water underneath the track, when topping and widening the roadbed, since this will result in water pockets. One should never forget that drainage is of prime importance in successful track maintenance.

Distributes Load Better

By G. S. CRITES Division Engineer, Baltimore & Ohio, Baltimore, Md.

The prime purpose of sub-ballast is to provide better distribution of loads to the subgrade, where this is needed. If the subgrade is dry and unyielding, so that it does not deform under load there will be no need for sub-ballast. However, if the subgrade is of the type that holds water, causes track to heave and works out or up under load, subballast should provide drainage, prevent upheaval and give a better distribution of the loads to the sub-

grade.

Sub-ballast is usually a better material than that available for the subgrade, but is not as good as standard ballast. On coal-burning roads, locomotive cinders are used for subballast and they make an excellent mat for the top-ballast, by keeping moisture in the soil from reaching the ballast and causing it to heave. Cinders do not shear readily under load, so that they carry the loads uniformly to a larger area of the roadbed than hard ballast will. Permeable soils will provide drainage, but do not distribute the loads as well as the cinder mat, while the hard ballast tends to puncture the roadbed and cause water pockets.

The depth of sub-ballast depends on the character of the ballast above and of the subgrade beneath. The main point is to get sufficient depth to prevent the top ballast from puncturing the sub-ballast mat and starting water pockets, but it should be so placed that it fully drains and does not itself act as a water pocket.

Generally, fouled ballast can be

cribbed to the bottom of the ties and distributed for a sub-ballast mat onto spread and put under the ties with a light lift. The lift should be the

which fresh clean ballast can be least possible that will effectively prevent water and mud from rising to the bottom of the ties for an economical period. It is obvious that if water and mud are kept below the bottom of the ties the track will not pump. A raise of three inches on cinders usually suffices for this kind of sub-ballast work.

Can Maintenance Be Contracted?

To what extent is it feasible to contract building maintenance in these days of labor shortages? What are the advantages? The disadvantages?

Few Men Available

By A. T. HAWK Engineer Architect, Chicago, Rock Island & Pacific, Chicago

The situation with respect to maintenance-of-way labor is acute, primarily as a result of draining off all of the younger men and experienced helpers for military service and the lure of war plants where earnings are higher than the railways can afford to pay. The older men have generally remained to protect their pension rights. As a result of these changes, about all that we have left in the building department is sufficient force to take care of minor breakdowns and emergency

Without help from other sources, the railways cannot possibly keep their greatly overworked transportation plant going. We have gone from a period of light traffic and slim earnings, when by force of circumstances we were compelled to defer a large amount of important work and were unable even to keep up with essential maintenance, to one of record-breaking traffic and earnings, in which extraordinary demands are being made on our facili-

In the earlier period, conditions were so bad that many roads were forced into receiverships and those that were not were compelled to scrimp in every way possible to "get by." Now that traffic has risen above any previous level, the enforced neglect of the lean years is rising up to plague us in many ways, and we are under the necessity of making many repairs and replacements to avert a serious breakdown of some of our facilities.

To accomplish this, not a few roads have resorted to the contracting of a considerable volume of maintenance work that they have heretofore preferred to do with their own maintenance forces. We have been successful in contracting locally, with experienced men who, in the main, have been able to obtain locally the materials needed for the jobs. In the vicinity of war industries, however, it has not been possible to do this, since in these areas practically all labor, both skilled and unskilled, is engaged in these plants.

One of the advantages of contracting building maintenance, especially to local carpenters or contractors, is that the work can be started immediately and completed promptly; another is that a large number of jobs can be carried on simultaneously and the work can be cleaned up much faster than has been possible at any time since the debacle of 1929. because of the limited forces we have employed since that time.

About the only disadvantage of this practice is that the work costs more, partly because the contractor's wages are higher, partly because his workman's liability insurance may run as high as 11 per cent of his pay roll, and partly because he must obtain a profit or go into bankruptcy. However, at present the advantages far outweigh the disadvantages.

Short of Men Everywhere

By GENERAL INSPECTOR OF BUILDINGS

We are suffering from a shortage of men on every division and must of necessity leave some things undone, particularly those of a routine nature, unless we can rely on help such as can be obtained from con-tractors. With traffic at its present volume, making new demands on our facilities constantly, a part of the force we have at our disposal is engaged continually in carrying out work that must be given preference over routine tasks, although they too may be important.

We already have a great deal of deferred maintenance on our buildings, and it is our desire not to allow this to increase if we can avoid doing so. While the amount of deteriora0-

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tion that will accrue in one or two years in a building that is in good condition may be almost negligible, the amount that will accrue in the same time in a building already deteriorated measurably, may be many times that in the first building.

In this situation, and to avoid, as auch as possible, allowing our buildings to deteriorate further during the period when we are unable to attend to them ourselves as we wish, we have contracted the maintenance of a considerable number of structures. While this has not been confined to any type or class of buildings, much of it has been to stations in the smaller towns and particularly on outlying districts. In many places we arrange with a local carpenter or painter to repair locks or replace broken window panes and do similar minor jobs as they arise, allowing the agent to O.K. the bills and send them to the supervisor. For more important jobs we have arranged with contractors in the larger towns to do all of the work needed within a radius of, say, 50 or 60 miles. For these jobs we make a joint inspection and agree on the amount of work and on the bill of materials.

We have also contracted most of the alterations that we have made in enginehouses, shops and other buildings. We have contracted particularly renewals of roofs and repairs to concrete and brick platforms and other work that does not involve critical materials. We generally assign one or more of our experienced men as inspector to make sure that the work is done satisfactorily and that the contractor does not interfere with the functions of the building more than is necessary.

found close to the ends of the rails, joint bars with center overfill should be employed, the overfill being vertical or lateral, depending on the type of joint.

If the rail is on a curve and is badly worn, and there is a possibility that the heads of the new joints will interfere with wheel flanges, it may be desirable to transpose the rail. If the rail bases are corroded appreciably on the fishing surfaces just beyond the old bars, it is sometimes desirable to reduce the length of the new bars approximately one inch to insure a uniform bearing on the rail This will avoid the possibility that the new joint will not fit into the worn portion of the rail. This is particularly important if joints with oversize fishing are to be used. It is well to emphasize again the desirability of lubricating the rail ends, since this facilitates the application of the joint bars and the tightening of the bolts.

Where rail ends are to be built up, the track should be lined and surfaced after the new joints have been installed. Until this is done, neither welding, grinding nor any other work on the rail ends should be started. Where the rail ends are built up before the old joints have been removed, irregular surface, wasted material and high joints are

likely to result.

When Applying Joint Bars

To reduce wear and avoid damage to the rail and fastenings, what sequence should be followed when applying joint bars to new rail? To old rail? Why?

Few Rules Necessary

By W. E. GADD Eastern Sales Manager, Rail Joint Company, New York

To avoid damage to new rails and fastenings, only a few rules are First, one should make sure that there are no burrs, sharp edges or other imperfections that would cut into the contact areas of the bars or prevent them from becoming fully seated. This possibility is eliminated on some roads by having the fishing surfaces of the rail ends ground at the mills. Second, before the joints are applied, the rail ends should be cleaned and oiled, preferably after the rails have been set in place on the ties, to prevent them from becoming fouled with particles of dirt or ballast, which will affect the fit of the joint bars.

The third rule is that, to insure that a perfect application of the joints will be made, and regardless of the number of bolts in the joint, the center bolts shall be tightened first; then the intermediate bolts, if a six-hole joint is being used; and, finally, the end bolts. In this connection, it is recommended that the bolts be tightened two or preferably three times, regardless of whether the tightening is done by hand or by bolt tighteners. To guard against the cocking of head-contact bars, that is, failure to seat squarely while

the bolts are being tightened, the bases of the bars must be tapped inward. It is not necessary to do this with headfree joints.

A similar procedure can be followed with insulated joints, with the exception that the bolt tightener should not be used because it draws the tops of the joints in too quickly. The hand-method of tightening these joints is preferable, since it affords an opportunity to drive the bases and tighten the bolts alternately.

Where a bolt tightener is employed, as with a rail gang, the operator should carry a light hammer for driving the joint bars into position, as such a hammer will be all that is necessary under ordinary conditions. It should not be overlooked by maintenance officers, however, that, even with close supervision, certain designs of joint bars may be applied and the bolts tightened with the bars in a cocked position. This should always be avoided, for where it occurs, the only remedy is to loosen the bolts, square up the bars and retighten the bolts.

In general, the same procedure as outlined for the application of new joints on new rail can be followed when applying new joints on old rail. However, a careful study of the rail ends should be made prior to doing this work. The fishing surfaces should be measured to ascertain whether a full or an oversized bar will be needed. If excess wear is

Must Be Clean

By C. O. ENLOW Roadmaster, Panhandle & Santa Fe, Lubbock, Texas

To reduce wear and avoid damage to rail and fastenings when applying joint bars to new rail, the rail ends should be cleaned thoroughly of all foreign substances and as much of the mill scale as possible removed by the use of a steel-wire brush. Then a coat of lubricant should be applied to the fishing surfaces of the rail. The correct amount of expansion should be assured before the joints

are applied.

These items having been cared for, the joint bars should be applied, care being exercised to insure that they are in correct position. Then the bolts should be inserted and the nuts run on until they are snug but not tight. At this point the bars should be examined to determine whether they are fitting correctly. If so, continue to tighten the bolts alternately until the desired tension is obtained. Never allow the bolts to be given their final tension unless the bars fit perfectly. To do so will cause damage to the rail, the bars and the bolts, and will cause the joints to kink.

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After the rail has been in service for six months, the bolts should be gone over and if there is any slack it should be taken up. If the expansion has bunched, the bolts should be loosened on all joints where there is excess expansion and it should be readjusted. Joints should be lubricated once a year to prevent them from freezing and to prevent wear when the surfaces become dry. This same method will apply to old rail, except that the bars should be oiled before they are applied.

Increasing the Life of Ties

When installing ties, what precautions can be taken that will increase their service life? What is the importance of each?

Do Not Always Appreciate

By C. D. Turley Engineer of Ties and Treatment, Illinois Central, Chicago

Although trackmen and their immediate superiors do not always appreciate fully the importance of careful and correct installation, the fact remains that the ultimate tie life may be affected materially by the things that are done or left undone when the tie is installed. Many details are involved in this operation, and close inspection and supervision in the field are necessary if best results are to be obtained.

Although not coming strictly under this question, perhaps the most important precaution that can be taken to insure maximum service life of ties, is to make certain that ties of particular woods containing particular preservative treatments, are selected and installed where they will give longer and more effective service than any other ties available. Another precaution that should be observed is to center the tie plates on the ties, so that the load will be distributed equally and the full bearing area of the tie plates on the ties will

If the ties are pre-bored and preadzed, one should make sure that the tie plates are placed so that the spike holes in the plates will register with the pre-bored holes in the ties. A sufficient number of anti-creepers should be applied to insure that the ties will not be skewed in the track, thereby damaging the wood fibres around the spike holes and, in some cases, splitting the ties through the spike holes. Tie tongs should be used when handling ties or pulling them under the rail, instead of using picks. Spike mauls or sledges should not be used for driving ties into the track or to move them to the correct

Care should be taken to place the heart side of the tie down, and to see that the ties are spaced uniformly so that each will carry its proportion of the load. The ballast should also be tamped firmly under new ties to prevent them from swinging.

Several Factors Involved

By Supervisor of Track

Several factors are involved in the installation of ties in a way that will increase their service life. In the first place, hardwood ties should be installed on curves and softwood ties on tangents. It is also desirable to use hardwood ties on long descend-

ing grades and elsewhere where train speeds are unusually high. Hardwoods and softwoods should not be mixed on curves, because the tip plates cut into the latter sooner and deeper than into the hardwoods, and thus affect the surface. It is also wise to use hardwood ties at the ends of open-deck bridges. The same plan should be adopted for switch ties, using the hardwoods for high-speed turnouts and those that carry a heavy movement on the turnout side.

Ties should be placed squarely across the track and with the specified spacing. Picks or shovels should never be used to draw the tie under the rail, and it should not be hammered with a sledge or maul when moving it for spacing, since this practice causes damage to the wood structure that will shorten the life of the tie definitely. Care must be taken to apply the tie plates so that they are centered on the tie and so that the shoulder is not under the rail

Poor spiking has a detrimental effect on the life of ties. The spike should be set perpendicular and driven straight into the prebored holes. Otherwise the wood surrounding the holes will be damaged and become subject to early decay.

Modifying Bridge Programs

Considering the present volume of traffic and the shortage of labor, should modifications in the normal bridge program be made in 1944? What? How? Why?

No Justification

By A. R. KETTERSON
Engineer of Bridges, Canadian Pacific,
Montreal, Que.

Unless one believes that the difficulty of obtaining labor and material during 1944 is likely to be more pronounced than during 1943, there seems to be no justification for modification of the normal bridge program for 1944, compared with what was accomplished last year. I am inclined to believe that 1943 was our most critical year.

No doubt, so far as traffic is concerned, the present volume will continue through 1944, and probably longer, but so far as production is concerned, there seems to be some evidence that, as regards certain materials required for bridges, there is a general improvement in delivery.

During the last two or three years the execution of essential bridge programs has depended on the availability of the necessary materials and skilled labor, in both the shop and field, but it is a reasonable conclusion that, eliminating strikes, industry is now so organized that it can produce, to the necessary degree, the material required to support our effort in the war theatres and, at the same time, provide reasonable support for the important war effort in the field of transportation. For these reasons, I can see no reason for be lieving that the actual bridge programs, as executed in 1943, cannot be taken as a basis for 1944.

Should Be Modified

By A. R. Harris
Assistant Engineer of Bridges, Chicago
& North Western, Chicago

For the purposes of this discussion, the phrase "normal bridge program" will be defined as meaning the volume of bridge maintenance and

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improvement that would be carried out in peace time, in a year in which earnings are at an average level. Such a program will include the replacement of individual members of timber structures, repairs to stone and concrete structures, repairs to steel spans, and the painting of structural steel. Improvement work will include the rebuilding of worn out untreated pile bridges with treated timber; the replacement of timber bridges with pipe culverts and the filling of the remainder of the opening, where the openings are larger than necessary; the replacement of low-rated steel spans with other spans of greater carrying capacity; and the rebuilding of highway bridges that are in poor condi-

Some maintenance work, such as extensive repairs to masonry structures and the overhauling of steel structures, should be deferred unless the work is of an emergency nature or where, if corrosion is allowed to go on, repairs will be out of the question. Painting should be done on structures where corrosion during the next two years will become detrimental or where there is a definite obligation to the public to maintain a good appearance.

Improvement work on branch lines should be deferred for the duration, unless the actual cost of the improvement is less than the estimated maintenance cost for the next three years. Improvements on the main line should be undertaken only when a combination of two or more of the following conditions are present: (1) the substructure and superstructure are overloaded to the extent that the speed of trains must be restricted to reduce impact; (2) the substructure shows definite signs of beginning failure, resulting from movement of the foundation; (3) there are sub-standard clearances of through spans, which are a hazard to the safety of trainmen and which restrict the size of shipments; (4) the making of adequate repairs will require critical materials in nearly as large quantity as replacement with a new type of structure, such as culvert pipe and fill. At present, timber appears to be more critical than steel, and its use should be minimized. The rebuilding of highway bridges should be deferred until after the war when funds will be available to government agencies for the improvement of highways.

Curtailment of work that would be done normally, requires that inspection be maintained to a very high standard and that repairs be made promptly wherever required in the interest of safety and to assure a continuous flow of the heavy traffic we are handling. Work that is undertaken should be planned carefully, to avoid interruption of traffic while it is under way. For example, in rebuilding a double-track bridge, the installation of crossovers can be justified from the standpoint of non-interference with traffic.

Among the reasons for modifying the normal bridge program are: (1) it is the patriotic duty of every person to refrain from doing any work that can be deferred for the duration, unless it can be shown that it will not detract from the war effort; (2) when business returns to normal with the close of the war, the railways will be able to ascertain the effects of competitive forms of transportation on branch line traffic and can then determine what improvements on these lines are justifiable, since, if they are made now, they may turn out later to be wasted capital; (3) the carry-over of a large back log of work until after the war, will provide employment for returning service men and will contribute toward maintaining a satisfactory general level of business; and (4) the rate of production of timber will likely continue to fall off because of a growing shortage of labor. Large users of timber should restrict its use, so far as possible.

Benefit of Fixed Camps

Are fixed camps of benefit at this time in obtaining or holding labor? Why? What facilities should be provided? Who should look after them?

Not at Present.

By DISTRICT ENGINEER

We have always maintained a few fixed labor camps at points where local labor was not obtainable, and found them to be a necessity if we were to keep our quota of men at these places. In general, these camps were small; that is, they housed from 5 to 25 men. The class of labor that occupied them was seldom "fussy' about the camp facilities, except that they wanted heating and cook stoves, although in good weather a considerable part of the cooking was done out of doors. Where possible, these camps were placed just outside the town or village limits.

We provided outside toilets and made a special effort to keep the living quarters weather tight and in good repair. Some of the smaller camps, for housing four to eight men, were boxcar bodies, but we covered them with heavy roofing felt and lap siding and added roofs, doors and windows, so that they had the appearance of small neat cottages. For the larger camps we constructed one-story houses or grouped two or four boxcars and roofed them over, so that they too presented a neat appearance. In general, the camps were located where the men could raise a garden and some of them also planted flower beds and took a very considerable pride in maintaining the good appearance of

Today, labor is scarce and difficult to get. At some of the points where we maintained camps, and the gangs were permanent, that is, we retained the men over winter, we have been able to hold some of the older men, but none of the younger ones, some of whom have been inducted into the army or have been lured by high wages in war plants. At other points, the men have all left, and if we succeed in getting a few men they do not stay and while they remain they seem to be completely indifferent about the appearance of the camp and its surroundings.

While I believe in providing decent living conditions for men whom we undertake to house, and I am inclined to provide more facilities, such as water, showers, electric lights and space for recreation, than we have done heretofore, I do not believe that they will be of much help at this time, so far as either obtaining or holding men is concerned. The labor we are able to get at present is distinctly low grade in every respect and, while the men should be made comfortable, the turnover is too great to make it worth while to provide facilities of this nature, which they show no signs of appreciating.

Depends on Area

By Engineer Maintenance of Way

Whether benefit can be derived from the maintenance of a fixed labor camp will depend in large measure on the area under consideration. In areas surrounding war industries, labor is almost unobtainable and even if we do succeed in

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getting a few men, they work only a little while and drift away, or they migrate to the war plants. In some of these areas, we have been able to carry on only because some of our older men have remained with us and because we have so relaxed our age and physical requirements that we are now employing men whom we would not have even considered two years ago. But, as these men generally live at home, a labor camp, no matter how well conducted, has no attractions for them.

Heretofore, we have not maintained fixed labor camps in the full meaning of the word, although I believe that we could have done so to advantage in some places. Most of our camps have been for the purpose of augmenting section labor where it was scarce locally. Many of these camps consisted only of condemned boxcars, which were set off where they would be least obtrusive. Some of them, where labor was scarce perennially, were fixed up with siding and roofs to resemble small cottages, but most of them were merely boxcars with windows cut in them. The latter were hot and stuffy in summer and too cold for winter use. so that only men who were used to low-grade living conditions could be induced to occupy them.

While we may not, as yet, have learned a great deal from the present labor stringency about housing labor in fixed camps, the conditions under which we are now working has set some of us thinking. With the cessation of hostilities, conditions should be quite different from these under which we are now working. Labor will be plentiful, and there will be enough deferred maintenance to keep a sizeable force occupied for several years to overcome it. There has been such a migration of labor to industrial centers that family ties have been uprooted, and I foresee the need for more housing facilities for detached laborers than ever before.

Outside housing is likely to be scarce for several years in many localities, so that adequate housing facilities will be a boon to both the railway and the men. Camps should be neat and comfortable, and be equipped with sanitary bunks. They should also be equipped with electric lights, bathing facilities, recreation space and, if possible, sanitary space and, if possible, sanitary toilets. The old boxcars should be discarded and replaced with welldesigned cottages or dormitories, depending on the number of men employed. If the gangs are of sufficient size to require dining facilities, these should be provided. In other words, the camps themselves should be of a character that will attract and hold

men. If men with families are available, it is likely that a better class of permanent labor can be obtained than where reliance is placed on

floating labor, provided detached cottages are provided. Poor living conditions go hand in hand with inefficient and undependable labor.

Conserving Critical Materials

In what ways can water-service maintainers conserve critical materials without lowering the dependability of water stations?

Must Do More With Less

By E. M. GRIME Engineer of Water Service, Northern Pacific, St. Paul, Minn.

In view of the emergency defense regulations under which we all are now working, it is difficult for a maintainer to obtain critical materials; yet the water stations must be kept in first-class operating condition. The problem is, therefore, to do more with less than we have been There are many accustomed to. places where it has been possible to substitute iron and steel for the more critical brass and bronze; creosoted timber for steel, when the latter was the more critical; synthetic rubber balls in chemical pumps, where polished steel balls were formerly considered necessary; ordinary steel, even if necessary to replace it frequently because of rapid corrosion, in place of critical non-corroding metal; synthetic resinous pipe in place of small copper pipe; asbestoscement pipe for cast-iron pipe; reclaimed cast-iron pipe for new pipe; concrete chimney jacks for critical steel; concrete in buildings for critical lumber; and to make other substitutions, such as will occur to a resourceful man. It may be possible also to rehabilitate, at a reasonable expenditure of labor, certain old equipment and make it operate successfully for the duration, just as well as new equipment.

During the present emergency, some of these substitutions may cost even more than the critical materials that are replaced, but just now it is not always the cost alone that counts, rather it is "are we doing something to hasten the day of victory?" Judgment is always necessary to assure that the substitution maintains full operating reliability.

The emergency is such that replacements should be kept available for parts subject to sudden failure or excessive wear, but when replacement becomes necessary, the worn or defective part, if at all practicable to do so, should be built up by welding or should be overhauled in some

other manner, so that it will be available for emergency use. Every piece that was formerly considered scrap, should be examined to determine whether it is possible to repair it and thus make it available as a substitute part. In many cases the purchase of new and unusual pipe fittings can be avoided by welding. In some cases where gas engines are in need of extensive repairs, electric power may have become available and second-hand motors can be found to substitute for the prime mover.

Now is the time for every man in maintenance service to exercise all of the ingenuity he can muster, in the effort to keep every piece of equipment in satisfactory operation and at the same time, hold requests for repair parts, complete overhauling and similar work, to the minimum. Careful attention to lubrication and to the handling and replacement of packing cannot be over emphasized at this time, to the end that the lift of every moving part will be lengthened as much as practicable.

Can Find Many Ways

By C. R. KNOWLES Superintendent of Water Service (Retired), Illinois Central, Chicago

There are many ways in which a alert water-service repairman can conserve critical materials and at the same time maintain water stations at their full efficiency and dependa-While the repairman has little control over the selection or the furnishing of the materials he must use, he does have direct control over their distribution and use. The rules covering the duties of repairmen do or should require that they shall have charge of and be responsible for such tools and materials as are necessary for the performance of their work, and they must know that they are used properly.

Water-service men as a whole are not wasteful in the use of materials, but are the reverse of wasteful. However, even where care is exercised. iving

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constant vigilance is necessary to avoid practices that may result in waste or misuse of critical materials that are so badly needed and so diffi-cult to obtain. They can conserve vital materials by discouraging the accumulation of excessive supplies at local shops and in pump houses. This is true particularly with respect to material that deteriorates somewhat rapidly, as rubber valves and packing. Sufficient material should be kept on hand, however, to care for ordinary running repairs. While a dead stock of materials is never desirable from the standpoint of economy, it is particularly objectionable at this time when all materials are at a premium, because of the difficulty of obtaining the most trivial necessities. Again, carelessness in the use of materials has no place under normal conditions, and is little less than criminal now.

Sheet packing may be wasted by using a thicker sheet than required or by failure to cut a gasket in such a way as to minimize waste; by using a valve designed for 300 lb. pressure where one for 125 lb. will answer; and by using expensive cylinder oil where black oil will suffice. These are only a few of the needless wastes that can be avoided easily.

Materials can also be conserved by the use of the right tools for the job, say by the use of a wrench instead of a hammer on a nut; by the use of a steel-faced hammer instead of a softfaced hammer; or a block of wood on materials that are easily damaged by a blow. Failure to drain pumps and pipe lines exposed to low temperatures, the creation of fire hazards by using open flames to thaw pipe lines and other similar careless practices all contribute to the waste of critical materials

after they have been placed correctly should be the responsibility of the officer or supervisor in immediate charge of the areas that are being protected.

Standards for the installation, maintenance and use of first-aid fire appliances are available from the National Fire Protection Association, 60 Batterymarch Street, Boston, Mass. These standards should be placed in the hands of everyone having responsibility for the protection of property against fire.

No Set Rules

By C. R. KNOWLES

Superintendent Water Service (Retired), Illinois Central, Chicago

No set rules can be established for the location of fire extinguishers that will apply in all cases, since every case is an individual problem, but certain principles can be laid down. For this reason a discussion of the subject must deal more or less in generalities. There are certain considerations that must be given weight, however, in selecting and

placing fire extinguishers.

The purpose of the hand extinguisher is to put out the fire in its incipient stage, as it does not have sufficient capacity to fight a fire of any magnitude. For this reason, the extinguisher should be placed where it can be reached quickly and carried as quickly to the point of use. should, therefore, be about shoulder high, so that the arm can be slipped through the strap. It should also be in a conspicuous place so that one does not need to hunt for it, and where it will be easily accessible.

To avoid obstructions that might interfere with reaching them, the extinguishers should be placed adjacent to passageways. If more than one is needed, they should be so distributed that each extinguisher will cover a prescribed area on the basis of one extinguisher to each 2,500 to 5,000 sq. ft. of floor space, depending on the hazard. If the amount of combustible material or its flammability is limited, as in an office, one extinguisher to each 5,000 sq. ft. is sufficient, but a wood shop should have one for each 2,500 ft. Under particularly hazardous conditions it may be desirable to install additional

The division supervisor of bridges and buildings is usually responsible for the location and maintenance of the extinguishers. The foreman, chief clerk or other person in charge of the local forces should be responsible for their condition and use.

Locating Fire Extinguishers

What rules should be observed in locating fire extinguishers? Why? Should the location be specially marked? If so, how? Who should be responsible?

Outside Fire Area

By FRANK R. BRADFORD Director of Safety and Fire Protection, Boston & Maine, Boston, Mass.

The first rule when seeking to locate fire extinguishers is to find out what your fire insurance rating organization desires, because if you do not fulfill their requirements they may increase your insurance rates. Having obtained this information, the next step is to see that the extinguishers that have been provided to take care of the insurance requirements are of the right type and that they are in the right places for your special needs. In some cases this may mean providing additional units, such as foam or carbondioxide extinguishers for oil processes, vaporizing liquid or carbon dioxide for electrical hazards, in either smaller or larger than normal sizes, and determining whether they shall be placed on or very near the equipment that is being protected.

In general, it is desirable to have extinguishers placed in or just outside the area to be protected, and in such position that the person who discovers the fire will see one when he turns around to look for help, or will find one when he goes out of the area to sound the alarm. If machinery, stacked material or other obstructions interfere with ready view of the extinguisher, it may be necessary to indicate its location by painting the posts or walls high above them with some distinctive symbol, or by hanging distinctively colored lights above them. If a scheme of either painting or lighting is adopted, it should be made uniform within the building or plant.

Obviously, the natural place for extinguishers is in corridors and in main aisles where they are most visible and least likely to be obstructed. Unfortunately, however, this puts them in the places where they are most likely to be knocked down by passing tractors or trucks, and may constitute a bumping hazard. It is frequently necessary, therefore, to put them in places that are somewhat less prominent, in which case signs, lights or special markings should be employed to indicate their locations. It is usually good practice to place extinguishers in foremen's and checker's cabins or booths, in warehouses or storage yards and to display "Extinguisher Inside" signs on the outside so that they will be visible from all directions.

It is the responsibility of the plant management to provide and place extinguishers, but the details may be delegated to the chief of the plant fire brigade, the millwright, the fireprotection or safety inspector or the insurance engineers. The care and maintenance of the extinguishers

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-N.EWS of the Month

President Still Wants the St. Lawrence Seaway

President Roosevelt last month informed Senator Aiken, Republican, of Vermont, that he is "convinced that the time has come for a non-partisan effort to secure Congressional authorization for the St. Lawrence development in the near future in order that the project may be available for early post-war construction." The president's advice was given in a letter of March 3 to Senator Aiken, who is sponsor of a pending bill (S. 1385) to provide for Congressional approval of the St. Lawrence agreement with Canada.

Limit Occupational Deferment of Men Under 26

Announcement was made on March 14 by Maj-Gen. Lewis B. Hershey, director of Selective Service, that a draft registrant from the age of 18 through 26 may not be considered a necessary man for occupational deferment unless the state director of the state in which he is employed recommends such deferment, the only other exception for such registrants being if they are engaged in an activity specifically excepted by the Director of Selective Service from the new policy.

A.A.R. Names Technical Research Adviser

Clyde Williams, director of the Battelle Memorial Institute, Columbus, Ohio, has been engaged by the Association of American Railroads as technical consultant to advise the railway industry on research matters. Mr. Williams will make a study of the railroads' technical problems with a view to co-ordinating and organizing research relating to technological methods and processes, and will maintain headquarters at 59 East Van Buren Street, Chicago.

U. S. Clamps Down On Black Markets in Tickets

The Federal Bureau of Investigation last month opened its drive on alleged illegal trafficking in railroad reservations by arresting 31 persons at Miami, Fla., and Miami Beach. Included among those arrested were 16 railroad employees, 14 hotel workers and one taxicab driver, all of whom face fines of \$5,000 and imprisonment not to exceed two years upon con-

viction. The fact that the F. B. I. sweep is to be nationwide was indicated when, following publication of a report of the Florida arrests, a nationally-known radio news commentator said that J. Edgar Hoover, head of the F. B. I., had announced that additional arrests were planned and may be expected to occur in various parts of the country within a short time.

Passenger Fare Tax Now 15 Per Cent

Passage of the new tax law passed over the President's veto has resulted in an increase from 10 per cent to 15 per cent, in the rate of the excise tax applied to passenger fares, effective April 1. No change in the tax rate on the transportation of property was made in the new revenue act.

Seeks Funds for Grade Crossing Problem

Judge R. V. Fletcher, vice-president of the Association of American Railroads, last month urged before the House roads committee that a definite part of the proposed three billion dollars for a postwar program of highway construction (as is provided in H. R. 2426), be set aside for the elimination of highway-railroad crossings throughout the country. would not seem unreasonable that 20 per cent of the proposed three billion dollar expenditure for highways be ultimately spent for this specific purpose, he suggested, explaining that a survey undertaken by the A.A.R. grade crossing committee had developed that there are 6,000 points in the United States where crossings should be eliminated by separation of grades, 1,700 points where existing separations need reconstruction, and 8.200 points where signal protection of high-way-railroad crossings should be provided. As it has been estimated that each grade separation project would cost, on the average, \$100,000, each reconstruction project \$76,000, and each signal installation \$3,000, the aggregate cost of the suggested work would be around \$865,000,000, Judge Fletcher pointed out in his statement to the committee.

Joseph B. Eastman Dies

Joseph Bartlett Eastman, director of the Office of Defense Transportation since

its inception late in 1941 and an Interstate Commerce Commissioner since 1913 died suddenly of a coronary occlusion at March 15 in a Washington, D.C., hospin, where he had gone on February 19 under orders from physicians, who were carened over his health. Brig. Gen. C.D. Young, heretofore deputy director of the O.D.T., has been named acting director by President Roosevelt—to head the agency until a permanent successor in Mr. Eastman is named.

Committee Seeks to Fill Railroad Jobs

Conferences between government agescies, the railroads and railway employe brotherhoods, have led to the formation of a Railroad Manpower Mobilization Committee, to conduct a drive to il 100,000 current and impending railreal positions. The major manpower needs of the railroads are divided into ten calgories: Shop workers, such as machinish and blacksmiths; track workers; bridge and building mechanics; workmen for freight houses, stores and roundhouse; yard and road brakemen; locomotive fire men; clerks of all kinds; telegraphen, telephoners and towermen, signal men and signal maintainers; and marine worken both licensed and unlicensed.

While the shortage of railroad labori acute, the O.D.T. said that it is reconsized in the industry that many of the jobs can be filled without extensive training, while others can be taken care of by upgrading or by "enlarged training programs."

"The primary need," however, it was emphasized "is for more men and women to join the ranks of railroad worken' In this connection it was pointed out the each of the groups represented on manpower mobilization committee had undertaken to contribute specific service in the "manpower drive." The unions, i was explained, "have undertaken to promote recruitment through the active pur ticipation of their local lodges, and by couraging their members individually b present the advantages of railroad ployment through personal contact Among these advantages were mentions seniority rights in a permanent industry vacation pay, "stable labor regulations", wide variety of available jobs, and got ernment-administered retirement and employment insurance plans.

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Personal Mention

General

R. D. Garner, chief engineer of the Central Vermont, has been promoted to acting general manager, with headquarters as before at St. Albans, Vt.

Horace W. Waters, assistant trainmaster on the Macon division of the Central of Georgia, and a maintenance officer by training and experience, has been promoted to trainmaster on that division.

w. w. Morrison has been appointed vice-president and general manager of the Pittsburg & Shawmut. He will also continue as chief engineer of that company.

W. F. Koehn, division engineer of the Laurentian division of the Canadian Pacific, has been promoted to assistant superintendent of that division, with headquarters at Montreal, Que., succeeding A. R. McLeod, who has been granted a leave of absence because of ill health.

Arthur Anderson, assistant engineer, New York Central System, with headquarters at Washington, D.C., has been promoted to assistant to vice-president, with the same headquarters, succeeding John G. Brennan, whose death on February 23 was reported in the March issue.

Major F. L. C. Bond, vice-president and general manager of the Central region of the Canadian National, with headquarters at Toronto, Ont., and an engineer by training and experience, has retired after 45 years service. Major Bond was born at Montreal on February 21, 1877, and graduated from McGill University, Montreal, in 1898. He entered the service of the Grand Trunk Western in 1898 as assistant to the resident engineer, Eastern division. In 1901 he was appointed engineer in charge of double track construction. From January to March, 1902, he was night superintendent on construction of the Park Avenue tunnel of the New York subway system, returning to the Grand Trunk in April of that year. He was then appointed resident engineer, Eastern division, in which position he remained until 1913, when he became a division engineer on the Eastern lines. After service in World War I, Major Bond returned to the Grand Trunk as chief engineer, and following amalgamation of the lines comprising the Canadian National, he was appointed regional chief engineer, Central region, with headquarters at Toronto. He held this position until April, 1924, when he was appointed general superintendent of the Montreal district. In 1936 he was promoted to general manager of the Central region, and in 1939 he was elected vice-president in addition to his duties as general manager of the Central region. Major Bond has long been active in the A.R.E.A. and in 1941 he served as president of that organization.

Railway Engineering and Maintenance

Engineering

Murray O. Cochrane, assistant superintendent of the Danville and Western at Danville, Va., has been appointed assistant engineer maintenance of way of the Southern's subsidiary lines.

W. L. Fisher, assistant engineer on the Cleveland, Cincinnati, Chicago & St. Louis (Big Four), with headquarters at Mattoon, Ill., has been promoted to fire prevention engineer, with headquarters at Cincinnati, Ohio.

F. C. Cunningham, supervisor of track on the Chesapeake & Ohio, with headquarters at St. Albans, W. Va., has been promoted to assistant division engineer, with headquarters at Ashland, Ky., to succeed C. C. Madison, who has been transferred to Russell, Ky., as reported in the March issue.

K. H. Hanger, engineer maintenance of way on the Missouri-Kansas-Texas at Dallas, Tex., has been promoted to chief engineer, with headquarters at St. Louis, Mo. J. J. Gallagher, division superintendent, with headquarters at Denison Tex., has been advanced to engineer maintenance of way, succeeding Mr. Hanger.

R. E. Farmer, division engineer on the Algoma district of the Canadian Pacific, with headquarters at Sudbury, Ont., has been transferred to the Laurentian division, with headquarters at Montreal, Que., succeeding W. F. Koehn, whose promotion to assistant superintendent of the Laurentian division is reported elsewhere in these columns.

H. J. Bogardus, division engineer on the Port Huron-Grand Rapids division of the Pere Marquette, with headquarters at Saginaw, Mich., has been promoted to assistant engineer maintenance of way, with the same headquarters, a newlycreated position. H. W. Kellogg, track supervisor at Saginaw, has been advanced to division engineer, succeeding Mr. Bogardus. Mr. Bogardus was born at Grand Rapids, Mich., on September 23, 1892, and attended the University of Michigan. He entered railway service in 1916 as a transitman on the Pere Marquette and was promoted to assistant division engineer of the Chicago-Petoskey division in 1919. In November, 1926, Mr. Bogardus was advanced to the position he held at the time of his new appointment, effective March 1.

George R. Doull has been appointed bridge engineer of the Atlantic region of the Canadian National, succeeding Casimir S. G. Rogers, who has retired. Mr. Mr. Rogers was born at Niagara Falls, Ont., in 1877, and graduated from Queen's University. He began engineering service with the Dominion Bridge Company at Montreal, Que., and in 1916 went overseas on active service in World War I, attaining the rank of major as assistant controller of labor on the British General Headquarters staff. After being demo-

bilized he served for a year on the Grand Trunk Arbitration Board as inspecting bridge engineer, and then joined the Canadian Northern in the same capacity at Toronto. In 1921 he was transferred to Moncton, N.B., as bridge engineer, which position he held until his retirement on March 15.

Victor R. Walling, whose promotion to assistant chief engineer of the Chicago & Western Indiana, and of the Belt Railway of Chicago, with headquarters at Chicago, was reported in the March issue, of Railway Engineering & Maintenance, was born at Tripoli, Iowa, on May 24, 1880, and graduated from the University of Kansas in 1901. He entered railway service in June, 1901, as a draftsman for the Cananea Consolidated Copper Company's railway at Cananea, Sonora, Mex., later serving as instrumentman on



Victor R. Walling

the Southern Pacific, and on January 15, 1903, returning to the Cananea Consolidated as first assistant engineer. On March 1, 1907, he was advanced to chief engineer and on August 12, 1907, he was promoted to superintendent and chief engineer. On June 20, 1912, Mr. Walling went with the Chicago & Western Indiana as first assistant engineer, with headquarters at Chicago, and three years later he was promoted to principal assistant engineer in charge of construction, track elevation and maintenance. In 1933 he was appointed engineer maintenance of way of both the C. & W. I. and the Belt Railway of Chicago, and in March, 1940, he was advanced to superintendent of both roads, the positions he held at the time of his new appointment.

Robert W. Ross, division engineer on the Western region of the Canadian National, with headquarters at Edmonton, Alta., has been promoted to district engineer, Western region, with headquarters at Winnipeg, Man., succeeding J. E. Davison, who has resigned.

Mr. Ross was born at Walton, Ont., on May 12, 1885, and entered railway service in August, 1904, as a chainman of the Grand Trunk Pacific (now part of the Canadian National). Two years later he was advanced to instrumentman at Winnipeg, being transferred to Melville, Sask., in 1908. In 1910, Mr. Ross was pro-

Railway Engineering and Maintenance

moted to resident engineer on construction, with headquarters at Prince Albert, Sask., later serving as resident engineer, maintenance, at Melville, and at Watrous, Sask. In 1918 he was advanced to division engineer, with headquarters at Biggar, Sask., and in September, 1920, he was transferred to Edmonton, Alta., remaining at that location until his new appointment became effective on January 1.

James C. Patterson, whose retirement as chief engineer maintenance of way on the Erie, with headquarters at Cleveland, Ohio, was reported in the March issue, was born at Carmichaels, Pa., on January 21, 1882, and graduated from Pennsylvania State College in 1905, entering railway service in June of the latter year as a rodman in the maintenance of way department of the Pennsylvania. In August, 1906, he became a draftsman on the New York Central & Hudson River (now part of the New York Central), and in April, 1907, entered the service of the Cleveland, Cincinnati, Chicago & St. Louis (Big Four), where he was engaged on location surveys. In October of the same year, he became a field engineer for John C. O'Bryan, consulting engineer, remaining in that position until April, 1909, when he re-entered railway service as an assistant engineer on the Chicago Great Western. In July, 1913, Mr. Patterson was appointed chief draftsman on the Erie, and was promoted to assistant valuation engineer in May, 1916. He was made office engineer in February, 1917, and was promoted to principal assistant engineer in June, 1918. In March, 1920. he was promoted to regional engineer of the New York region, and in February, 1927, was further promoted to superintendent maintenance of way. In 1928 he was advanced to the position he held at the time of his retirement.

Carlton B. Harveson, engineer, maintenance of way of the Baltimore & Ohio,



Carlton B. Harveson

has been promoted to chief engineer, maintenance of way, with headquarters as before at Baltimore, Md., succeeding Philip Petri, who has retired. E. L. Exley, division engineer at Cumberland, Md., has been advanced to engineer, maintenance of way, at Baltimore, replacing Mr. Harveson.

Mr. Harveson was born at Jacksonville, N.J., on December 18, 1885. He attended Bucknell College and entered railroad service on April 1, 1905, with the Philadelphia & Reading Terminal as a draftsman. After serving successively as rodman, assistant supervisor and supervisor, Mr. Harveson was in military service in this country and abroad from 1917 until 1919. He returned to the Philadelphia & Reading Terminal in 1919 as a supervisor, and in July, 1922, became a division engineer on the Baltimore & Ohio. He was promoted to the position of engineer maintenance of way in June, 1936, and



Philip Petri

continued in that capacity until his present appointment.

Mr. Petri was born on February 5, 1877 and entered railroad service on August 4, 1899, in the construction department of the Baltimore & Ohio at Cincinnati, Ohio. After serving in various capacities in the construction and real estate departments, Mr. Petri was appointed assistant division engineer of the Chicago division on September 1, 1906. The following January he was named division engineer of the Newark division. He then served successively as division engineer of the Shenandoah, Ohio River, Connellsville, and Cumberland divisions, being advanced to the post of district engineer maintenance of way, at Pittsburgh, Pa., in September, 1915. After eight months as special engineer in the office of the assistant to federal manager at Baltimore, Mr. Petri became division engineer of the Cumberland division at Cumberland, Md. He was promoted to engineer maintenance of way, Eastern lines, in September, 1926, and to chief engineer maintenance of the Baltimore & Ohio system on June 10, 1936, which position he held until his recent retirement.

Track

H. L. Woolwine has been appointed assistant roadmaster of the Norfolk division of the Norfolk & Western, with headquarters at Crewe, Va., to succeed William Lindsey, transferred.

T. J. Hartnett, a foreman on the Pittsburgh & Lake Erie, has been promoted to assistant supervisor of track, to succeed M. J. O'Connor, whose promotion to

supervisor of track, with headquarten at Beaver Falls, Pa., was announced in the March issue.

George W. Schraeder, assistant track supervisor on the Pere Marquette, with headquarters at Saginaw, Mich., has been advanced to track supervisor, with the same headquarters, succeeding H. W. Kellogg, whose promotion to division engineer is reported elsewhere in these columns.

John Krizman, general foreman on the Erie at Buffalo, N.Y., has been promoted to supervisor of track, with headquarten at Warsaw, N.Y., to succeed J. P. Morrissey, whose promotion to assistant division engineer at Salamanca, N.Y., wa reported in the March issue.

Siemon W. Schaumburg, whose promotion to roadmaster on the Chicago Great Western, with headquarters at Clarion, Iowa, was reported in the March issue, was born in Germany, on October 13, 1891, and entered railway service on April 15, 1907, as a track laborer on the Northern Pacific at Leeds, N.D. In 1911 he was promoted to section foreman, subsequently serving as extra gang foreman and yard foreman at various points on the road. On October 10, 1926, Mr. Schaumburg went with the Chicago Great Western as a section foreman, with headquarters at Stillman Valley, Ill., serving in this capacity and as extra gang foreman at Byron, Ill. A short time later he was transferred to Pearl City, Ill., remaining in that location until his new appointment.

W. P. Nichols, supervisor of track on the Chesapeake & Ohio, with headquarters at Riverton, Ky., has been appointed to the newly-created position of general track inspector, with headquarters it Richmond, Va. C. C. Coyner, supervisor of track, with headquarters at Thurmond, W. Va., has been transferred to Riverton to replace Mr. Nichols, and J. N. Van has been appointed supervisor of track at Thurmond to succeed Mr. Coyner. W. M. Dunn has been appointed supervisor of track, with headquarters at St. Alban. W. Va., to replace F. C. Cunningham, whose promotion to assistant division engineer is noted elsewhere in these columns.

B. E. Wardlow, assistant supervisor of track on the Ohio division of the Cleve land, Cincinnati, Chicago & St. Louis (Big Four), has been promoted to supervisor of track, with headquarters # Anderson, Ind. George Caraboa, acting supervisor of track on the Indiana division, has been advanced to supervisor of track, with headquarters as before # Indianapolis, Ind. Neil Terry, a clerk Cincinnati, Ohio, has been promoted assistant supervisor of track, with head quarters at Galion, Ohio. Millard 1 Bodenmiller, section foreman at Belle fontaine, Ohio, and Stanley R. Furn extra gang foreman at Winchester, Ind. have been advanced to assistant supervisors of track, with headquarters also at Galion. J. W. Hutchins, general foreman

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on the Illinois division, has been promoted to assistant supervisor of track, with headquarters at Hillsboro, Ill.

L. J. Turner, supervisor of work equipment of the Chicago, Rock Island & Pacific, with headquarters at Chicago, has returned to service after a 12-month leave of absence because of illness. F. A. Wilof absence because of liness. F. A. Williams, who has been acting supervisor of work equipment during Mr. Turner's leave of absence, has been appointed assistant supervisor of work equipment, with headquarters at Chicago.

Bridge and Building

L. H. Hornsby, engineer of bridges of the Seaboard Air Line has been appointed bridge engineer—maintenance, and W. N. Downey is named engineer of bridges in charge of the bridge department. Both officers have headquarters at Norfolk, Va.

Charles V. Talley, supervisor of track on the Ohio division of the Cleveland, Cincinnati, Chicago & St. Louis (Big Four), has been promoted to supervisor of bridges and buildings, with headquarters at before at Anderson, Ind. Carl R. Gardner, carpenter at Bellefontaine, Ohio, has been advanced to assistant supervisor of bridges and buildings, with the same headquarters.

M. P. Oviatt, assistant supervisor of bridges and buildings on the Alabama Great Southern (part of the Southern), at Birmingham, Ala., has been promoted to supervisor of bridges and buildings on the New Orleans & Northeastern (part of the Southern), with headquarters at Hattiesburg, Miss., succeeding J. R. Kelly, who has been transferred to the St. Louis-Louisville division of the Southern, with headquarters at Louisville, Ky., replacing J. B. Singleton, assigned to other duties. J. T. Roberts, assistant to the roadmaster of the Cincinnati, New Orleans & Texas Pacific (also part of the Southern), has been advanced to assistant pervisor of bridges and buildings on the Alabama Great Southern, with headquar-ters at Birmingham, relieving Mr. Oviatt.

Obituary

Ralph Norman Begein, an engineer by training and experience, who retired in 1938 as vice-president, advisory, of the Chesapeake & Ohio, died at his home in Richmond, Va., on February 27.

Charles A. Thanheiser, who resigned in 1915 as engineer maintenance of way of the Missouri-Kansas-Texas, to enter private business, died at Houston, Tex., on February 8.

Julius E. Willoughby, consulting engineer of the Atlantic Coast Line, and formerly chief engineer of that road, died at Sarasota, Fla., on March 11. Mr. Willoughby was born at Arkadelphia, Ala., on October 12, 1871, and graduated in civil engineering from the University of Alabama. He entered railway service in

Railway Engineering and Maintenance

1892 with the Louisville & Nashville, serving in various positions in the engineering and real estate departments. In 1899, he was promoted to assistant chief engineer of construction of new lines in Alabama and in 1900 he was advanced to engineer of construction of the Alabama and Florida branch. Mr. Willoughby was appointed division engineer of the Knoxville, LaFollette & Jellico (L. & N. subsidiary) in 1901 and later was advanced to chief engineer of that subsidiary. In 1905, he was promoted to engineer of construction for the system and in 1912 he became chief engineer of the Caribbean Construction Company and the National Railroad of Haiti. He returned to this country in 1913 as assistant chief engineer of the Atlantic Coast Line and in 1915 was promoted to chief engineer, which position he held until January 1, 1942, when he was appointed consulting engineer.

Arthur E. Owen, chief engineer of the Central of New Jersey and the New York & Long Branch, died March 21 on the train between Jersey City Terminal and Bound Brook, N.J., en route to his home at Abington, Pa. Mr. Owen, who was 68 years old, was born at Montclair, N.J. He attended Rutgers College, and entered railway service in 1898 as a rodman of the Central of New Jersey. The following



Arthur E. Owen

year he became transitman and assistant engineer, and in 1907 was appointed principal assistant engineer. In 1916 Mr. Owen was promoted to the position which he held until the time of his death. From 1938 until October 1, 1943, he was also chief engineer of the Reading.

Booklet Tells Advantages of Aluminum. -Listing 12 economic advantages of aluminum in the manufacture of various products, a booklet has been published by Aluminum, Company of America, Pittsburgh, Pa., under the title of Aluminum Imagineering Notebook. Intended to demonstrate the many uses to which aluminum may be put by industry after the war is over, the 24-page booklet first lists the 12 economic advantages and then devotes a chapter to each one, with several illustrations accompanying the text.

Association News

Maintenance of Way Club of Chicago

A total of 157 members and guests were in attendance at the meeting of the club on the evening of March 27, the main feature of which was an address on Off-Track Work Equipment, by A. J. Neff, supervisor of work equipment of the Denver & Rio Grande Western, and which was supplemented by a showing of the Rio Grande's Kodachrome moving picture on the same subject. The motion picture was accompanied by an oral description throughout. Mr. Neff also conducted a discussion session following the presentation of the film.

The next meeting of the club, which will be the annual meeting, with election of officers, will be held on April 24. This meeting will feature as guests the chief engineering and maintenance officers of the railways entering Chicago, and will be given over largely to a forum discussion of the major construction and maintenance operations in prospect on these roads during the current year.

Roadmasters' Association

Members of the Executive committee met in Chicago on March 14, with President E. L. Banion, Vice-President H. E. Kirby, Treasurer E. E. Crowley, Director Ray Marshall and Past-President A. B. Hillman in attendance. Plans for the selection of the Hotel Stevens as headquarters for the meeting on September 19-21 were ratified. Forty-two applicants were elected to membership. Subcommittees were requested to pursue their work with sufficient diligence to be able to present tentative reports at the next meeting of the Executive committee, which is scheduled to be held in Chicago on June 19.

Railway Tie Association

The program is shaping up rapidly for the annual meeting at the Netherland Plaza hotel, Cincinnati, on May 16-17.

In addition to the new subjects listed in the foregoing, each of those committees dealing with labor or materials was assigned the following new subjects: Means of conserving labor and materials, including the adoption of substitute non-critical materials, and specifications for the reclamation of released materials, tools and equipment.

Two committees of the association have scheduled meetings in April, these being the committee on Water Service, Fire Prevention and Sanitation, which will meet in Chicago on April 18, and the committee on Track, which will meet in Chicago on April 19.

American Railway Bridge & Building Association

The Executive committee will meet in Chicago on Monday, April 24, to transact business coming before the Association and to further plans for the annual meeting on October 17-19.

October 17-19.

Committee No. 1—Post-War Values of WarTime Practices in Bridge, Building and Water
Service Activities—(Chairman) E. H. Barnhart, div. engr., B.&O., Garrett, Ind.; (ViceChairman) R. E. Dove, mg. ed., Railway Engineering and Maintenance Cyclopedia, Chicago;
W. A. Batey, const, engr., U.P., Omaha, Neb.;
A. E. Bechtelheimer, engr. br., C.&N.W., Chicago; L. G. Byrd, supvr., b.&b., M.P., Poplar
Bluff, Mo.; R. W. Cassidy, asst. cost. engr.,
C.&O., Richmond, Va.; B. J. Chamberlin, scale
supvr., C.&E.I., Danville, Ill.; G. B. Davis, supvr.
b.&b., N.Y.C., Columbus, Ohio; J. A. Lewis,
asst. supvr. b.&b., N.Y.C., Utica, N.Y.; T. W.
Pinard, engr., b.&b., Penna, New York; G. L.
Sitton, ch. engr. m.w.&., Sou., Charlotte, N.C.;
A. A. Sirel, engr. drafts., C.&N.W., Chicago;
C. E. Smith, vice-pres., N.Y.N.H.&H., New Haven, Conn.; H. L. Veith, b.&b. supvr., Sou., Wilton, Ala. Ala.

ton, Ala.

Committee No. 2—Increasing the Capacity of Water Service Facilities to Meet Demands of Heavier Traffie—(Chairman) Guy E. Martin, supt., w.s., I.C., Chicago; (Vice-Chairman) K. J. Weir, supvr. w.s., C.M.St.P.&P., Chicago; R. C. Bardwell, supt. w.s., C.&O., Richmond, Va.; F. M. Ginter, fore.w.s., Alton, Bloomington, Ill.; J. P. Hanley, w.s. insp., I.C., Chicago; F. H. Masters, ch. engr., E.J.&E., Joliet, Ill.; A. C. Sachs, gen. fore. w.s., C.N.R., London, Ont.; C. O. Sathre, asst, supvr. b.&b., C.&N.W., W. Chicago; T. J. Sheehy, supvr. w.s., D.&H., Plattsburg, N.Y.; A. P. Smith, fuel & water supvr., M. P., San Antonio, Tex.; W. A. Stewart, asst. supvr. b.&b. C. of Vt. Stafford Springs, Conn.; E. E. R. Tratman, civil engr., Wheaton, Ill.; M. P. Walden, asst, supvr. b.&b., L.&N., Evansville, Ind. Committee No. 3—Keeping Work Equipment in

den, asst, supvr. b.&b., L.&N., Evansville, Ind.
Committee No. 3—Keeping Work Equipment in
Service—(Chairman) John E. Bird, asst. supvr.,
b.&b., N.Y.C., Corning, N.Y.; (Vice-Chairman)
V. E. Engman, ch. carp., C.M.St.P.&P., Savanna, Ill.; G. W. Benson, supvr., b.&b., C. of Ga.,
Macon, Ga.; H. F. Bird, supvr. b.&b., N.Y.C.,
Syracuse, N.Y.; Armstrong Chinn, gen. mgh.
Alton, Chicago; C. C. Eubank, asst, supvr., b.&b.,
C.&O., Huntington, W.Va.; B. H. Goodwin,
supvr., b.&b., Sou., Atlanta, Ga.; E. H. Haase,
b.&b., supvr., S.P., Tucson, Ariz.; J. L. Holmes,
supvr., b.&b., N.Y.N.H.&H., New Haven, Conn.;
V. W. Hutchings, b.&b. supvr., S.P., Bakersfield,
Cal., A. C. Jones, b.&b., supvr., S.P., Bakersfield,
Cal., A. C. Jones, b.&b., supvr., Sou. Parish, Ala.;
P. L. Koehler, div. engr., C.&O., Ashland, Ky.;
W. V. Parker, engr. research, U.S.P.H.S., Memphis, Tenn.; A. Wiitala, gen. fore. b.&b., L.S.
& I., Marquette, Mich.; Dee Worlow, b.&b. fore.,
M.P., Kansas City, Mo. M.P., Kansas City, Mo.

M.P., Kansas City, Mo.

Committee No. 4—New Possibilites in Building Designs and Materials—(Chairman) W. A. Huckstep, gen. bldg. supvr., M.P., St. Louis, Mo.; (Vice-Chairman) F. W. Dayton, arch. drafts, C. &N.W., Chicago; J. R. Burkey, const. engr., Union Metal Mfg. Co., Canton, Ohio; C. M. Burpee, P.&E. Ed., Railway Age. Chicago; P. B. Collier, b.&b. supvr., M.P., St. Louis, Mo.; K. E. Hornung, arch. drafts, C.M.St.P.&P., Chicago; L. E. Peyser, prin. asst. arch. S.P., San Francisco, Cal.; J. F. Redmond, supvr. str., N.Y.C., New York; S. R. Thurman, asst. b.&b. supt., M.P., Nevada, Mo.; J. S. Vreeland, assoc. ed., Railway Engineering & Maintenance, Chicago; L. C. Winkelhaus, arch. engr., C.&N.W., Chicago; L. C. Winkelhaus, arch. engr., C.&N.W.,

Chicago.

Committee No. 5—Bridge Inspection in the Light of Current Restricted Maintenance—(Chairman) H. M. Barlow, asst. gen. supvr. b.&b., C.&O., Richmond, Va.; (Vice-Chairman) R. W. Cook, gen. insp., C.&E.I., Salem, Ill.; J. E. Cooper, asst. b.&b. supvr., S.P., Oakland, Cal.; H. D. Curie, mast. carp., B.&O., Garrett, Ind.; R. Downard, supvr. b.&b., I.C., Paducah, Ky.; C. A. Hackett, asst. b.&b. supvr., S.P., El Paso, Tex.; W. A. Hutcheson, supvr. b.&b., C.&O., Clifton Forge, Va.; B. M. Whitehouse, gen. br. insp., C.&N.W., Chicago.

Committee No. 6—The Year's Developments in

insp., C.&N.W., Chicago.

Committee No. 6—The Year's Developments in Labor—(Chairman) George E. Boyd, assoc. ed., Raikway Engineering and Maintenance, Chicago; (Vice-Chairman) G. H. Holmes, supvr., b.&b., M.P., Falls City, Nebr.; R. C. Baker, b.&b. supvr., C.&E.I., Danville, Ill.; J. P. Canty, asst. to engr. m. of w., B.&M., Boston, Mass.; M. D. Carothers, ch. engr., Alton, Chicago; G. S. Crites, div. engr., B.&O., Baltimore, Md.; L. D. Garis, asst. gen. br. insp., C.&N.W., Chicago; J. S. Hancock, br. engr., D.T.&I., Dearborn, &Mich.; A. B. Hillman, engr. m. of w., Belt Ry. of Chicago—C.&W.I., Chicago; J. S. Huntoon, asst, engr. br., Mich. Cent., Detroit, Mich.; H. W. Jenkins, b.&b. supvr., N.Y.N.H.&H., Boston,

Mass.; D. T. Rintoul, gen. br. insp., S.P., San Francisco, Cal.; T. H. Strate, div. engr., C.M.St. P.&P., Chicago; H. A. Wistrich, asst. ch. engr. const. & m., Lehigh Valley, Bethlehem, Pa. Committee No. 7—Recent Developments in the

const. & m., Lehigh Valley, Bethlehem, Pa.
Committee No. 7-Recent Developments in the
Treatment of Timber to Increase Its Fire Resistance—(Chairman) J. F. Seiler, prin. engr., service bureau, American Wood Preservers' Association, Chicago; (Vice-Chairman) O. W. Stephens,
asst. engr. str., D.&H., Albany, N.Y.; H. M.
Church, gen. supvr. b.&b., C.&O., Richmond,
Va.; M. H. Dick, eastern ed., Railway Engineering and Maintenance, New York; A. G. Dorland,
asst. engr., E.J.&E., Joliet, Ill.; H. W. Hauerslev, ch. drafts.; C.M.St.P.&P., Chicago; F. W.
Hillman, asst. engr. m., C.&N.W., Chicago; F. W.
Hutcheson, asst. supvr. b.&b., C.&O., Newport
News, Va.; W. V. Kerns, supvr. tim. pres., C.&
N.W., Escanaba, Mich.; W. F. Martens, gen.
fore. b.&b. & w.s., A.T.&S.F., San Bernardino,
Cal.; J. W. Martin, fire & tunnel insp., S.P., Sacremento, Cal.; P. F. McNally, asst. b.&b. supvr.,
S.P., Salt Lake City, Utah; L. R. Morgan, fire
prev. engr., N.Y.C., Detroit, Mich.
Committee No. 8—Welding in Bridge, Building and Water Service Work—(Chairman) G. S.
Crites, div. engr., B.&O., Baltimore, Md.; (Vice-

ing and Water Service Work—(Chairman) G. S.
Crites, div. engr., B.&O., Baltimore, Md.; (Vice-Chairman) Lem Adams, vice-pres., Oxweld Railroad Service Company, Chicago; (Vice-Chairman)
L. M. Firehammer, gen. supvr., Ill. Ter., Springfield, Ill.; (Vice-Chairman) G. H. Johnson, gen.
fore. b.&b. & w.s., A.T.&S.F., Marceline, Mo.;
F. G. Campbell, asst. ch. engr., E.J.&E., Joliet,
Ill.; A. B. Chapman, br. engr., C.M.St.P.&P.,
Chicago: Laland Chaper, ch. engr., D.M.&I. Ill.; A. B. Chapman, br. engr., C.M.St.P.&P., Chicago; Leland Clapper, ch. engr., D.M.&I., Duluth, Minn.; A. R. Harris, asst. engr. br., C.&N.W., Chicago; C. R. Knowles, supt. w.s., I.C., retired, Chicago; H. C. Larsen, str. iron fore., C.St.P.M.&O., St. Paul, Minn; W. K. Manning, supvr. br., Erie, Cleveland, Ohio; I. A. Moore, tr. mast, C.&E.I., Salem, Ill.; F. R. Spofford, supvr., b.&b., B.&M., Boston, Mass.; I. F. Sterns, cons, engr., Chicago; A. A. Visintainer, asst, engr., Erie, Cleveland, Ohio; T. M. Von Sprecken, engr. br., Sou., Cincinnati, Ohio.

American Railway Engineering Association

The forty-fourth annual meeting of the association, held in Chicago on March 14-16, with 1,139 railway men from all parts of the United States and Canada in attendance, was one of the most timely and intensive in the history of the association. Supplementing the usual presentation of committee reports, the program was highlighted throughout by special features and addresses giving consideration to specific problems rising out of the war and to future problems with which engineering and maintenance officers will be faced incident to postwar adjustments and developments. Two special features were symposiums on Labor and Materials, these including a total of eight addresses, abstracts of all of which are presented in this issue.

At the meeting it was announced that the following officers had been elected for the enusing year: President, F. R. Layng, ch. engr., B. & L.E., Greenville, Pa.; vicepresident to serve two years, J. B. Akers, asst. ch. engr., Southern, Washington, D. C.; directors, W. H. Penfield, ch. engr., Milwaukee road, Chicago; C. H. Mottier, ch. engr., Illinois Central, Chicago, and J. E. Teal, transportation engr., C. & O., Richmond, Va. A. A. Miller, ch. engr., m. of w. and structures, M. P., and vice-president of the association, was advanced automatically to senior vice-president, succeeding Mr. Layng.

The Committees on Outline of Work and Personnel of Committees have completed the make-up of committees and assignments of subjects for the ensuing year, and a booklet containing the assignments and personnel of committees will be mailed to all members of committees early in April. This booklet will show the following standing and special committees and their chairs as well as the new subjects that have been assigned to these committees. Among the chairmen of the committees, those des nated by asterisks have been newly

Roadway and Ballast—F. W. Hillman, asst. engr. maint., C. & N. W., Chicago,

Ties-John Foley, chief, Lumber section Division of Purchases, War Production Board, Washington, D. C., chairman. New subjects-Ways and means for retarding the destruction of ties by mechanical week and reasons for the renewal of ties.

Rail-W. H. Penfield, ch. engr., C. M. S. P. & P., Chicago, chairman.

Track-I. H. Schram,* ch. engr mai of way, Erie, Cleveland, Ohio, chairman

Buildings-A. B. Stone, asst. ch. eng. N. & W., Roanoke, Va., chairman. subjects-Prefabricated buildings for mi way use; and fire retarding coatings.

Wood Bridges and Trestles-R. P. Har, asst. ch. engr., M.P., St. Louis, Mo., chir.

Masonry-A. N. Laird, br. engr., G. 7. W., Detroit, Mich., chairman. Highways—A. P. Button,* designing as

gineer, N. Y. C., Chicago, chairman.

Signals and Interlocking-H. L. Stan asst. ch. engr., signals, Penna., Philadelphia Pa. chairman

Records and Accounts-H. L. Restal val. engr., B. & M., Boston, Mass., chirman. New subjects—Valuation and depreciation: (a) Resume of developments of the current year in connection with the replatory bodies and courts; (b) I.C.C. va tion orders, reports and records; (c) De velopment of service lines and rates for & preciatory accruals.

Water Service, Fire Protection and Said tation-B. W. DeGeer, engr. w.s., G. N. S. Paul, Minn., chairman. New Subject Methods for taking water samples.

Yards and Terminals-W. J. Hede const. engr., Wabash, St. Louis, Mo., chair man . New subjects-Facilities for conveyo handling of l.c.l. freight at freight houses design and location of engine laundries and blow-off pits at engine terminals; and is cilities for servicing streamlined trains coach vards.

Iron and Steel Structures-J. E. Benhardt, br. engr., C. & E. I., Chicago, chir

Economics of Railway Location and 0 eration-M. F. Mannion, off. asst. to d engr., B. & L. E., Greenville, Pa., chairman New subject-Co-ordinated highway ice and its effect on the economics of ralway operation.

Wood Preservation-R. H. Duncan, s timber pres., C. B. & Q., Galesburg, L. chairman. New subjects—Development specifications for treatment of wood to per vent its destruction by fire-(a) Inclu chemicals, (b) Methods of treatment, (c) Methods of interpretations of tests.

Electricity-D. B. Thompson, mech. elec. engr., N. Y. C., chairman.
Uniform General Contract Forms-J. 5

Lillie, property and tax comm'r., G. T. W. Detroit, Mich., chairman.

Economics of Railway Labor-H. A Cassil, ch. engr., P. M., Detroit, Mich. chairman. New subject-Means of increase ing or conserving labor supply for the dur-



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They're compact, lightweight, and easy to start merely by pushing a button.

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Will pay you to write today for illustrates bulletin 42-PA.

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Check this list to see how many ways you can use SCHRAMM COMPRESSORS

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REPAIR SHOPS

Cleaning engines and machines by jets Operating jacks, lifts and hoists Running pneumatic hammers, drills, etc. Operating brazing forges and smith fires Supplying oil burners Tire inflation

GENERATING STATIONS

Operation of air circuit breakers

Railway Engineering Maintenance

tion of the war, advising the secretary currently of recommendations or practices that merit emergency publication by the A. R. F. A.

Cooperative Relations with Universities—Elmer T. Howson, vice-president and editor, Railway Engineering and Maintenance, chairman. New subject—The co-operative system of education for railway service.

Waterways and Harbors—N. D. Hyde,

Waterways and Harbors—N. D. Hyde spec. engr., N. Y. C., Chicago, chairman.

Standardization—A. R. Wilson, engr. of b. & b., Penna., Philadelphia, Pa., chairman. Maintenance of Way Work Equipment—C. H. R. Howe, cost. engr., C. & O., Richmond, Va., chairman. New subjects—Tie cutting machines; machinery and tools for repairing maintenance of way equipment; hoisting equipment; Diesel engines; electromagnets; and oil filters.

Clearances—A. R. Wilson, engr. of b. & b., Penna., Philadelphia, Pa., chairman. Waterproofing of Railway Structures

Waterproofing of Railway Structures (special)—J. A. Lahmer, sr. asst. engr., M. P., St. Louis, Mo., chairman.

Impact (special)—C. H. Sandberg,* asst. br. engr., A. T. & S. F. system, Chicago, chairman.

Supply Trade News

General

The Eastern district offices of the Duff-Norton Manufacturing Company, Pittsburgh, Pa., have been moved from the Empire State building, New York, to 250 Park ayenue.

The La Plant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia., has opened a sales office at 630 Fifth avenue, New York. Jay Fetters, formerly manager of the London office of the Caterpillar Tractor Company, has been placed in charge.

Personal

Ben Van Horn, has retired as manager of the Crane Sales division of Harnisch-feger Corporation, Milwaukee, Wis., after 47 years of continuous association with that company.

The David A. Hultgren Company, 80 East Jackson Boulevard, Chicago, has been organized by David A. Hultgren, formerly with the Massey Concrete Products Company, to specialize in representation for railroad and industrial supplies. One of the companies represented is the Universal Concrete Pipe Company, Columbus, Ohio.

E. W. Potratz, acting sales manager of the Harnischfeger Corporation, Milwaukee, Wis., has been promoted to manager of the Hoist sales division of the company.

Donald M. Crooks has been appointed midwest representative of the Douglas Fir Plywood Association, with headquarters

at Chicago, succeeding **David S. Betcone**, who has been transferred to the Eastern territory, with headquarters at Washington, D.C.

S. C. Johnson, assistant vice-president of the Dearborn Chemical Company, Chicago, has been promoted to vice-president in charge of the railroad department of the Eastern division, and not to vice-president in charge of the railroad department, as reported in the March issue.

W. G. McFadden, assistant Chicago district sales manager of the Allegheny Ludlum Steel Corporation, with headquarters at Chicago, has been advanced to manager of that district, succeeding P. E. Floyd, whose promotion to assistant general manager of sales, with headquarters at Brackenridge, Pa., was reported in the March issue.

Alton Parker Hall, assistant manager of sales of the New York office of the Bethlehem Steel Company, has been appointed assistant general manager of sales of the American Chain & Cable Co., with headquarters in New York.

Neil C. Hurley, Jr., executive vicepresident of the Independent Pneumatic Tool Company, Chicago, has been elected president, with headquarters as before at Chicago, succeeding Neil C. Hurley, Sr., who has been elected chairman of the board of directors. Edward G. Gustafson and John McGuire, treasurer and secretary of the company respectively, have been elected members of the board.

R. G. LeTourneau, Inc., Peoria, Ill., has formed its own sales distribution organization to replace distribution through Caterpillar Tractor Company dealers. Under the new set-up, E. R. Galvin continues as general sales manager, H. R. Conn as eastern sales manager, Harry L. Vines as western sales manager, and Paul Fulford as export sales manager. Howard L. Stilley, chief field engineer, has been promoted to central sales manager and has been succeeded by Robert D. Evans, assistant chief field engineer; John F. Johannsen, export general manager, has also been made export assistant general sales manager. E. M. Ferguson, district representative at Los Angeles, Cal., has been promoted to assistant western sales manager at Stockton, Cal.

The American Steel & Wire Co., subsidiary of the United States Steel Corporation, has created two separate divisions to handle the sale of electrical products and wire rope and construction materials. P. T. Coons, formerly head of the electrical, wire rope and construction materials department, which has been dis-continued, and B. M. Ashbaucher, a correspondent in that department, have been appointed manager and assistant manager, respectively, of the wire rope and construction materials division. T. F. Peterson, director of electrical cable engineering and research, and C. H. Eisenhardt, formerly assistant manager of the electrical wire rope and construction materials department, have been appointed manager and assistant manager, respectively, of the newly-created electrical division.

William C. Bamber, whose election is president of the Wendell & McDus-Co., New York, was reported in the March issue, was born at Lockport, N



William C. Bamber

Y., and attended Union College at Schenectady, N.Y. He started his business career with the General Electric Cospany on switchboard design work, and subsequently he was engaged in the design of substations for the first New York City subways. In 1905, he entered the service of the New York Central where he was also engaged in the design of substations. In the following year, he became connected with the railroad department of the Johns-Manville Sales Corporation, with headquarters at New York. Two years later, he entered the service of the Wendell & MacDuffie Cospany as treasurer, in which capacity he served until his recent election as president.

Russell M. Allen, general manager of sales of the Allegheny Ludlum Steel Coporation, has been elected vice-president in charge of sales.

Stanley H. Smith, manager of railway sales of the Philadelphia Steel and Win Corporation, Philadelphia, Pa., has been elected vice-president. Mr. Smith will continue to serve as president of Stanley H. Smith & Co., Cleveland, Ohio, and a vice-president of Eastern Railway Supplies, Inc., New York.

Obituary

Melvin B. Pattison, chairman of the board of directors of the Industrial Brownhoist Corporation, died on February 11, at Bay City, Mich. He was 7

Jesse Jay Ricks, chairman of the board of the Union Carbide & Carbon Corporation, died on February 20. He was 4 years of age. Mr. Ricks was graduated from the University of Michigan in 1901, and was awarded a bachelor of laws degree from the Michigan Law School in 1903. He joined the newly-formed Union Carbide Corporation in 1917, and late was appointed chief counsel. He was elected president in October, 1925, and chairman of the board in 1941.



Railway Engineering at Maintenance

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April, 1944

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"Protection" in the Readjustment Period

"Boss, Jim Smith told me yesterday that his conpany's up against it," said the star salesman to his railway sales manager.

"What's up, Bill?" replied the railway sales manager.

"They were loaded up with government orden-80 per cent of their output—and the government can celled all of them last week."

"That is a body blow—what're they going to do?"

"He didn't know. Thought they'd have to start all over again. You know they transferred their sales men into the plant and quit all their advertising when they got those government orders. Said they didn't need to sell."

"That's shortsighted."

"That's what it seemed to me. But I've been was dering how we're fixed."

"That's what's going through my mind too, be you've maintained your railway contacts to some extent at least, and we've been doing some adverting."

"I know that—but where'll we stand if the goverment cuts off our contracts?"

"Not as bad as Jim's company—but it'll still giw us a jolt."

"Shouldn't we prepare for it before it hits us?"

"What do you have in mind?"

"More advertising in Railway Engineering and Maistenance—larger space for a more complete story of our line—and every issue."

"Bill, I think you've got something there."

"It'll help us a lot, Boss. It'll renew our contacts in many offices I can't get to since you cut off my two assistants, and it'll introduce us to a lot of new men who've come up in the last few months."

"You're right. We need it. I'll get a larger campaign started in the next issue."

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

MAN POWER

WHEN HANDLING TIES WITH

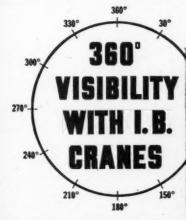
BEEGLE Mechanized Equipment

BEEGLE Mechanized Equipment will do your tie handling job quicker and cheaper with only two-thirds the labor usually required. It will handle ties from any type of car to seasoning piles, from seasoning piles to treating trams and from cars to piles along the right of way.

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WILL BE AVAILABLE ABOUT
MAY 1.

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TIE SERVICE COMPANY
East St. Louis Ulinois



When you're swinging up to 40 tons of heavy acterial on the end of a fifty-loot crane-boom you want to see what you're doing. That's why so many good operators swear by I. B. Cranes. They like the monitor-type cab because it gives them a full 380° visibility. They like the way the monitor-type cab improves ventilation. And they like the ease and smoothness with which they can bundle the I. B. Crane. Especially designed for questione or Diesel power, I. B. Cranes are modern in every respect and operating records prove their unusual efficiency.

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Railway Engineering and Maintenance

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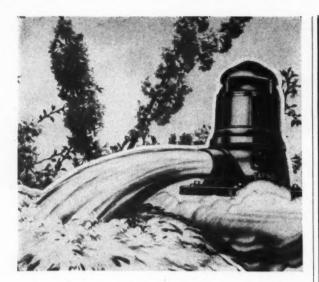
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For a Layne Water System

It's always Fair Weather for America's most skilfully designed, sturdily built and thoroughly proven Water Supply System. Sixty-two years of world-wide leadership in well and pump construction are today paying extra dividends in outstanding performance.

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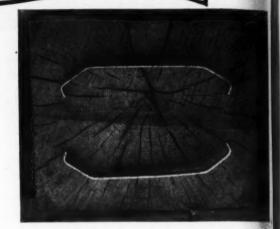
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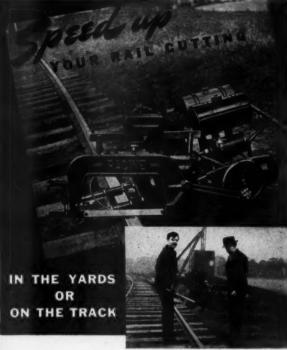
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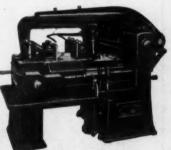
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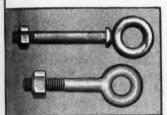
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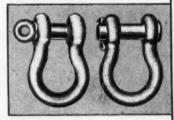
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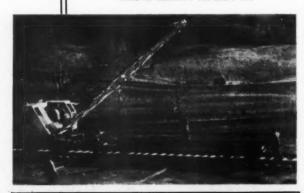
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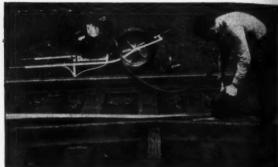


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ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON

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Woolery Machine Company	
Worthington Pump and Machinery Corporation	

complete fine of earthmoving tools. Save money and whip manpower porblems as so many other forward-looking railtoaders are doing with these vesatile off-track machines. Chart here shows how you can make profitable use of fast-moving Tournapulls, large capacity hauling units, Cranes, and Dozers . . . study it and see how you can benefit.

Letourneau Construction & Maintenance units

ON

Work Off-Track . . . No Traffic Delays . . . Make 50 to 60 Minutes of Every Working Hour Productive . . . No Big Grews or Work Trains Needed (for all tractors)

CARRYALL

TOURNA-

TOURNA-

MODEL D TOURNA-

SUPER C MODEL D TOURNA-

	2	MA IOB LISE	SECOND A DV	PULL:	CRANE:	TRAILER: (Capacity:		CRANE :	TRUCK	CONTROL	(for all trac-	(for all trac- tors fitted		(for all "Caterpliar"
X	Σ	ANJOR USE	SECONDARY USE	15 heaped yards)	20,000 lbs.)		Scraper & Dozer)	10,000 lbs.)	5 tons)	2	with PCU's)	with PCU's)	with PCU's)	tractors)
	Ē	New grade construction	u.	*		*	•			*	*	*		*
	Ľ	Curve relocation & grade reduction	ide reduction	*		*	*			*	*	*		*
		Strengthen and widen banks & slopes	banks & slopes	*		•	*			*	*	*		*
		Clear trees & brush for new roadways	r new roadways				*			*		*		*
NUI		Dig and clean drainage ditches	e ditches				*			*	*	*		*
111		Move and shift tracks			*		•	*		*			*	*
IDI		Grade for new siding	Grade for new sidings, spur & passing tracks	*			*			*	*			*
CONS		Move and lay ties & and passing tracks	Move and lay ties & rails for new sidings, spur and passing tracks		*			*	•	*		٠.	*	*
		Transport and place brids structures, pipe signal lights	Transport and place bridge members, drainage structures, pipe signal lights		*			*	•	*			*	
	_	Backfill around bridges & structures	& structures	•		•	*			*	•			*
	_	Reinforce roadbed		*		•	*			*	*			*
NCE		Remove slides, fill-in & repair wash-outs	repair wash-outs	•		•	*			*	*			*
NTENA		Remove or bury grass, eliminate fire hazard	Remove or bury grass, weeds, brush & trees to eliminate fire hazard				*			*	•			*
144	IAI	Snow removal in yards		•		•	•			*	•			*
1	Ľ	Clear tracks of wreckage in emergencies	ge in emergencies		*		•	*	•	*	-		*	*
N	W.	Load and unload work	Load and unload work train supplies & freight cars		*			*	1	*			*	
IITA93		Lift, move & stack ties, timbers & rails in supply yards	s, timbers & rails		*			*	*	*			*	
40		Coal handling and stockpiling	ckpiling	*		*	*		1	*	*			*
				1	4			6		L		-	A	AT.

**15-yd. Carryall Scaper, 17-yd. Tournatailer and Tournacrane (20,000 lb. lifning capacity) inferchaegaeble on same Super C Tournapull prime mover.

***9_3-yd. Carryall Screper, Tournacrane (4,000 n 10,000 lbr. lifning capacities)
and 5-ton Tournapull prime mover. For all "Caterpillar" tractors, Ailis-Chalmers L., L.O. HD10, HD14, S, SO; International TD40, TD18, TD14, Cletrac FD, FG, DD, DG, CG.

春春春春春春

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ETOURNEAL

BLUE BRUTE TRACKTEAM IN RAILROAD MARATA



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Blue Brutes win because they're trained for better teamwork. One Blue Brute portable Hand-i-air Compressor, the Worthington "packaged hurricane on wheels", delivers 60 cu. ft. per minute to four WTT-7 Tie Tampers. Just right for smooth air delivery through Feather* Valves, best in the long run.

You get no grandstanders. No throaty prima donnas waste your time, chew up your profit. A real team of straight-shooters, this famous five is matched for easiest-

Results? More air delivered, less air wasted, lower costs per foot of finished track - in short, your money's worth for each tie tamping dollar. Proof? Look who uses them - then try them!

Behind the Fighting Fro

BLUE BRUTE

Blue Brutes helped equip several way battalions for overseas Here, at home, our soldiers and ors see them in action** for t laying and repair, as well as for construction in Army camps, yards, air bases and ordnance p

*Blue Brute compressors and air too painted olive drab for the Army, batt gray for the Navy.

Get more WORTH from air with WORTHINGTO BUY BLUE BRUTES



Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have

always set the pace for easy operation - available in a wide range of weights and sizes.



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DEPENDS UPON

Rail Transportation

The strategic position of the railroads in wartime is demonstrated by the fact that in 1943 they handled 727 billion revenue ton-miles of freight, or more than 72% of the entire nation's inter-city freight, by far the greatest in history... To keep this heavy traffic moving safely, the best in track fastenings is demanded.

